THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LV. No. 1398.] LONDON, FEBRUARY 25, 1890. [42ND YEAR. Price 6d.

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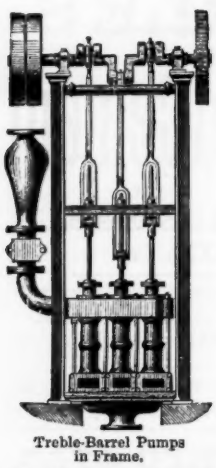

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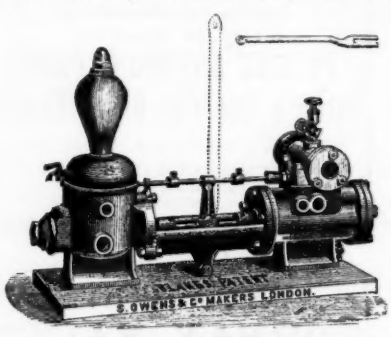

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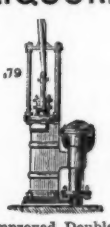

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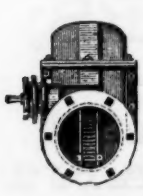

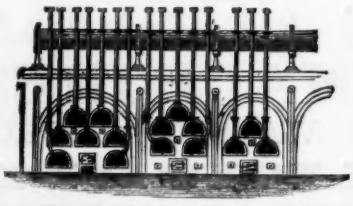

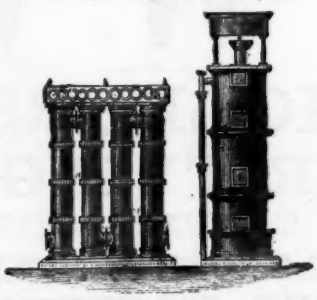

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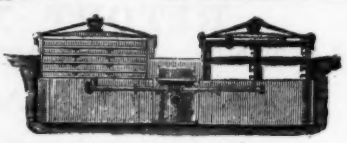

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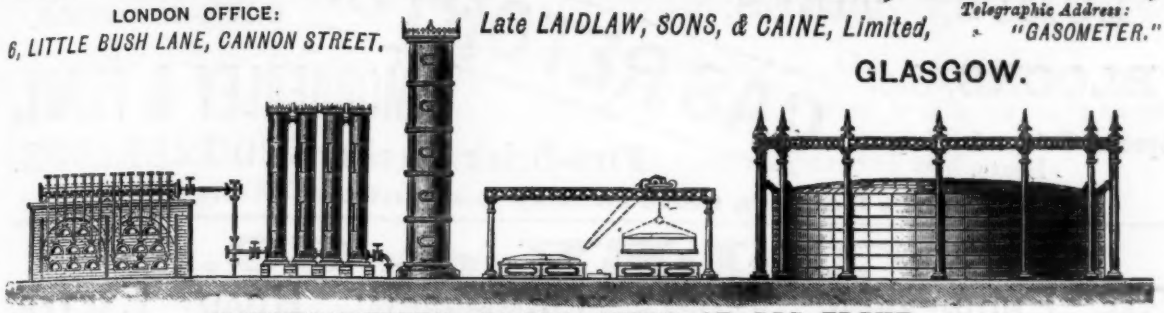

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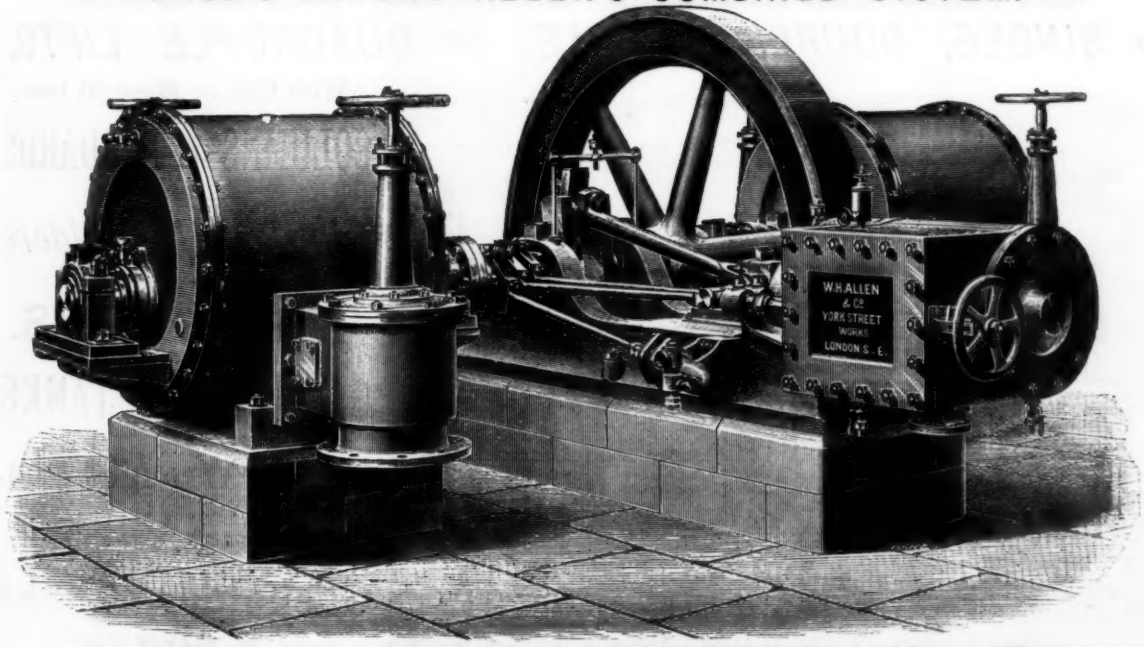

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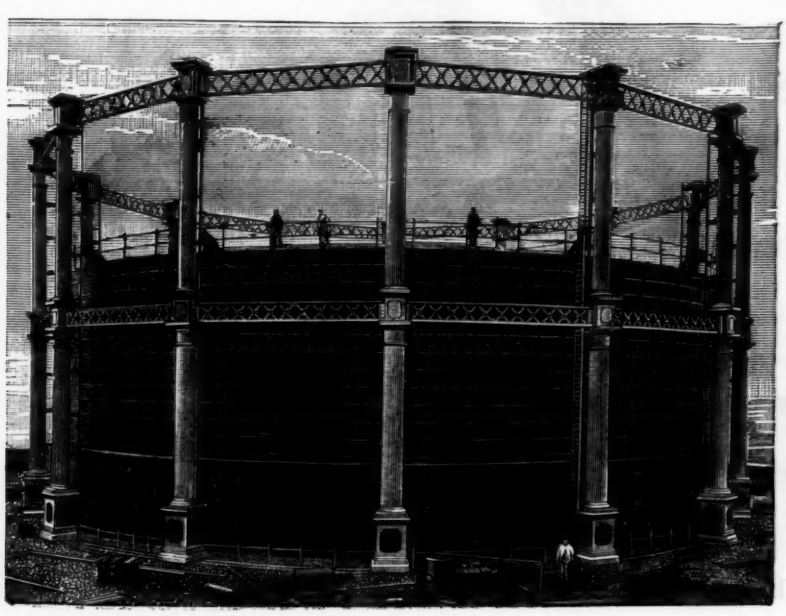

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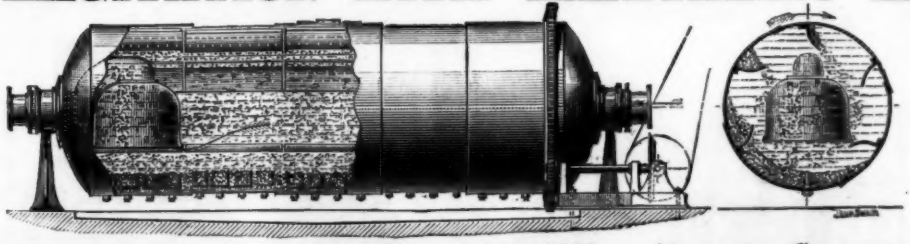

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NO SLIP.

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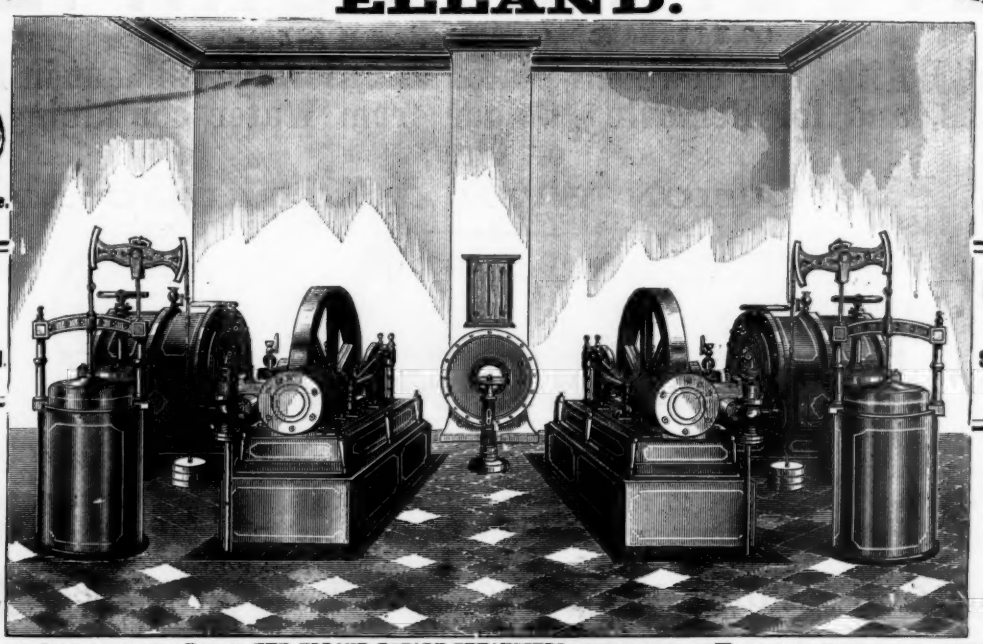

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Says of the ordinary Wet Meter, that—

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And of the Warner & Cowan Meter, it remarks that—

"By the recent improvement in Meters, patented by Messrs. WARNER & COWAN, the wheel is so constructed as, within a certain range, to register practically the same, under all the various positions of the water-line."—Vol. II., page 33.

Again, before describing the Warner & Cowan Meter and after having noticed previous inventions, the same authority states that—

"It must be admitted that, notwithstanding all that had been accomplished up to this point to insure accuracy in the measurement of gas, and ingenious as are many of the appliances for this purpose, there was a want of directness of aim on the part of the authors. There can be no question, also, that although the advantages which were undoubtedly secured were only secondary in character, the difficulties encountered—and, to the extent indicated, successfully overcome by the inventors—were more formidable than any that presented themselves in the initiation and perfecting of the remarkable invention now about to be described. This, indeed, is merely characteristic of the most striking mechanical inventions of modern times. Their usefulness and value are only equalled by their simplicity and beauty. The 'Warner & Cowan Meter' must be classed amongst the latter."

"Prior to the invention of the Warner and Cowan drum, all improvements in the measuring mechanism of the Gas-Meter had for their object the maintaining of the true water-line. . . . . The paramount excellence of the Warner and Cowan wheel consists in its being perfectly independent of any particular water-line, its registration being correct under all possible variations of level short of the limits of surcharge on the one hand and exhaustion on the other."—Vol. III., page 22.

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7th—May be fixed either above or below the level of the Lights.
8th—Cannot be tampered with without visibly damaging the outer case.
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Are upheld for five years without charge.

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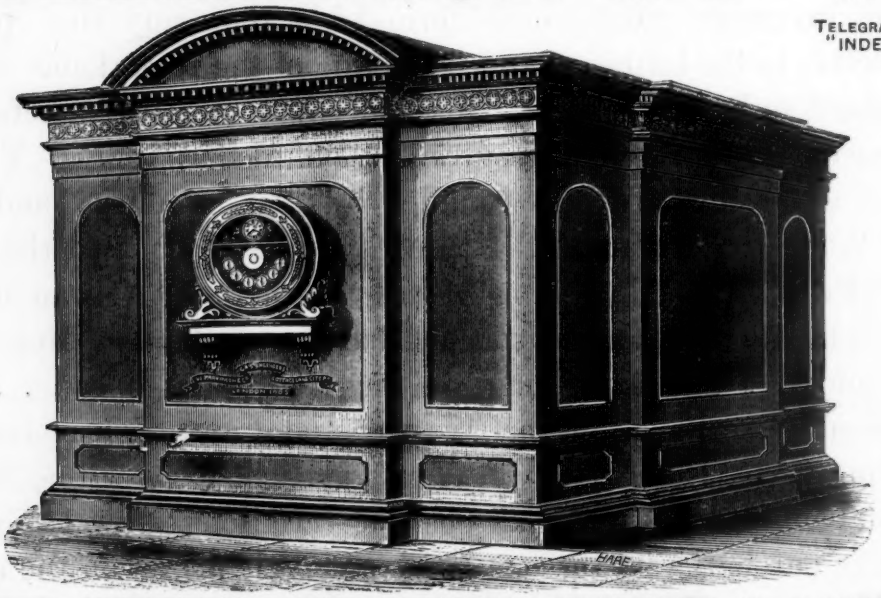

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W. PARKINSON & CO. have introduced the above design of Station Meter in order to meet the demand for a more ornamental Tank. It is simpler in construction than No. 1 Pattern, and consequently less in cost. All joints are planed, the most modern improvements introduced, and the entire Meter is of the strongest and most substantial description.

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MATERIALS and WORKMANSHIP of the VERY BEST QUALITY ONLY. PRICES, &c., ON APPLICATION.

Highest Award, Melbourne Exhibition.

[See also Advt., p. 364.

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

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THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, FEBRUARY 25, 1890.

The South Metropolitan Report and Accounts.

LAST week we could not do more with the report and accounts to be presented at to-morrow's meeting of the South Metropolitan Gas Company than mention the remarkable character of the former document. This has now been before the public for a week, and has been very widely circulated by the newspapers. It is illustrative of the spirit in which most organs of so-called public opinion are conducted that those newspapers which took the men's side in the strike that gave the report its chief interest, did not reproduce the Directors' strong indictment of the methods adopted by the strikers for gaining their ends, but merely reported the cost of suppressing the insurrection. Unless we are greatly mistaken, however, the losers in the recent conflict can find but a languid pleasure at most in the reflection that in ruining themselves they inflicted some loss upon their late employers; and to lay stress upon this aspect of the affair is to pander to one of the worst tendencies of poor humanity. So far as can be gathered, the prevailing opinion respecting the report is that it is a statesmanlike presentation of a case that appears more invulnerable the more it is disclosed. It remains to be seen what the proprietors will say about it to-morrow; but it will be a surprise and disappointment if they do not cheerfully consent to the small sacrifice of dividend for one half year for which their Directors have purchased peace for many years to come. It is possible that some shareholders may be curious to know whether the cost of preserving the mastery of their works is the lowest at which the object could have been achieved, in view of the possibility of another campaign of the same kind at some future date. In reply to an observation of this nature, it may be confessed at once that "war takes no account of "the economies." The first and only thing needful after war has been declared is to win; the question of cost is an after-consideration entirely. Probably there was never a victorious general, since warfare became a science, who would not have undertaken to repeat any one of his most successful campaigns at considerably reduced expense if necessary. To conduct a war to a triumphal issue requires that all eventualities shall be duly provided for; and this necessarily entails what to criticism after the event appears a redundancy of preparation. If we always knew the line our adversary would take, the extent of his resources, and the plan of his attack, we could meet him with proportionate measures; but this is precisely what he keeps from us at all hazards. If we have a dozen points open to his onslaught, it is imperatively necessary that all should be protected, although we may believe that, in the event, only one will be seriously imperilled. Wherefore, although the point has not been, and perhaps never will be raised, it may not be superfluous to declare that, in the unlikely event of a repetition of labour troubles in South London, as in Manchester or Salford, it would not be half so difficult or costly to the administration to do again what they have once done so well. The very lavishness of the expenditure of the South Metropolitan Directors—usually reputed, with reason, to be so careful of the pence—was calculated to overawe their enemies. If these ever raise their heads again (which they are not likely to do in the lifetime of this generation), they will begin by counting the cost of defying a Company prepared to spend money like water if necessary to maintain their position. Their eyes have been opened to the risks of rebellion in a way that they could not have believed without hard experience; and the result has been of incalculable value to the victors and to society at large.

The famous profit-sharing agreement, of which so many renderings have been circulated, is issued, for the edification of the proprietors, as a supplement to the report. It is unnecessary to examine its provisions at length here; suffice it to say that the most cursory perusal of the clauses of this most interesting document must remove the false impression purposely spread by the leaders of the Gas Workers' Union that there is anything compulsory in this offer to the Company's workmen of a beneficial interest in the undertaking, and that when once a man had accepted it, he might be reduced in wages or otherwise prejudiced in comparison with an uncovenanted man. Over and over again was this falsehood uttered by speakers at mass meetings called, as was facetiously said, to "discuss" the terms of the agreement—the "discussion" consisting of passionate harangues by men who never had a chance of participating in it, yet concentrated all their gutter glibness of speech to persuade and threaten their dupes against taking advantage of this means of improving their condition. Where are these demagogues now? Could they dare trust their skins in a mass meeting on Peckham Rye to celebrate the great benefit the Union has conferred upon the South London gas stokers who supported it?

Turning now to the accounts, it appears that the Company's revenue from gas for the past half year was £318,042, as compared with £341,596 for the corresponding period of 1888, when the price was 2d. per 1000 cubic feet higher. Coke fell from £83,047 to £80,468; but tar rose from £15,299 to £22,238, and ammoniacal liquor was a little better. The total receipts show a drop from £472,239 to £455,170. On the other side of the

account, the cost of manufacturing gas has risen from £245,894 to £290,061, or an increase of £44,167. All the entries under this heading are larger, with the exception of repairs and maintenance, which is nearly the same. The chief increases are, of course, in the cost of coals and labour; the former having risen from £159,352 to £178,758, and the latter from £36,396 to £60,179. These are very serious additional expenses, which could not have been anticipated at this time last year. Rents, rates, and taxes have risen from £17,574 to £20,350; and the other entries do not show much variation from precedent until we come to the portentous words "Strike expenses," which stand for £30,349. The effect of these expansions is to swell the cost of working the undertaking from £307,052 to £387,571. The report has told us what the Directors propose to do in face of these abnormal circumstances. The insurance fund is reduced by £15,000; and the other half of the strike expenses will be provided for by a reduction of dividend to 12 per cent. It now only remains to note that the secondary effect of the strike—the loss of business—is not shown by any actual reduction in the weight of coal carbonized, because this has risen from 293,510 to 301,850 tons. The effort to keep up the quality of the gas by way of compensating for a reduced pressure is indicated by an increase of cannel carbonized from 1189 tons to 2931 tons. On the other hand, proof of something very much out of the common having happened is to be seen in the fact that, notwithstanding the increased consumption of coal, the total quantity of gas accounted for is rather less than that for the corresponding period of the year 1888—being 2,831,283,000 as against 2,831,298,000 cubic feet. The whole year's increase has thus been lost. There is little else to notice in the accounts. The Official Auditor (Mr. Chas. H. Parkes) remarks that a forfeiture of £2, incurred during the half year, must be deducted from dividend. It is, of course, impossible to compare the Company's working for the period covered by these accounts with that of any other similar time, because of the disturbance due to the strike; from which it must be a matter of thankfulness to the proprietors and the public that the undertaking has suffered, on the whole, so little. An interesting meeting is to be anticipated to-morrow, when Mr. Livesey and his colleagues will submit themselves to the judgment of their constituents respecting their conduct during a crisis not easily paralleled in the history of the British gas industry.

The Gas Consumer Pays for All.

THERE is some very instructive reading in the remarks made by Mr. Alderman Priestman, of Bradford, in moving the adoption of the minutes of the Corporation Gas and Electricity Supply Committee, as reported in last week's JOURNAL. These statements may be taken for illustrations of some of the most striking passages in Mr. Henry Peaty's address to the Midland Gas Managers last Thursday. Here in the case of Bradford is to be found the positive example to prove the general description given by Mr. Peaty of the gas consumer who "pays for his own gas, pays a portion of the cost of "the electric current to his neighbours' lamps, and, "out of the superabundance of his wealth, pays a part "of the rates of the man who prefers electricity." All Mr. Alderman Priestman's subtlety will not serve him to get out of the position so clearly defined by Mr. Peaty. It is confessed that the electricity supply of Bradford does not pay; and the prospect of its paying in the future is so poor that the Committee have no heart for making extensions of the present plant, although they are ready to admit that in doing a better trade lies their only chance of salvation. What matters the bankruptcy of the electrical business, however, so long as there are gas profits to fall back upon? Alderman Priestman is ready to saddle the gas undertaking with a subsidy of £1000 a year towards the maintenance of the electrical speculation, and thinks it would be a "very cheap thing" to keep out electric light projectors at such a figure. This is an example of the corkscrew logic that is developed in the mind of an otherwise sensible man, when he once grows accustomed to consider the indirect taxation of gas consumers for the benefit of other people a right and proper principle. If any speculators chose to drop £1000 a year for the enjoyment of the luxury of supplying electricity in Bradford at 5d. per unit, why should they be prevented from doing so until they grow tired of the game? Why, that is a greater loss than all the electric lighting companies in London inflict upon the Metropolitan Gas Companies, who simply leave them alone. There is another curious point in Mr. Alderman Priestman's argument. He says that if the Corporation would put their electric light undertaking into the market, they could sell it at a profit of £10,000. This statement is one of the most remarkable condemnations of corporation management of a business of this kind that has ever come under our notice. For unless one is to accept the notion that there is somebody in Bradford willing to sink nearly £40,000 for the privilege of losing £1000 a year, there must be somebody who has confidence in his ability to convert what is a losing concern in the hands of the Corporation into a profitable business for himself. Regarded in all possible lights, this Bradford electric lighting venture is an egregious failure; but as long as Mr. Alderman Priestman can fill the gaps in the accounts with cash wrung out of the unfortunate gas consumers of the borough, he will probably continue to pretend that it is possible to sell electricity for lighting at 5d. per unit. It used to be said of the Roman augurs that they were too conscious of the character of their own pretensions to be able to look in each other's faces without laughing. How interesting it would be to watch, unseen, a private and confidential meeting of a few professed electrical enthusiasts, such as those who have been long enough in the trade at Bradford, Taunton, Brighton, and Leamington to know the inside of the matter! Unfortunately for most of these experts, they have not, like the Bradford Committee, other people's money to spend upon their fancy.

The Board of Trade Returns.

THE Board of Trade returns relating to the statutory gas undertakings of the United Kingdom have at last been issued, and the principal statistics which they present are reproduced in another column. The return relating to Gas Companies is made up to the end of 1888; while that dealing with gas undertakings belonging to Local Authorities is for the year ending March 25 last; so the average delay of the two statements is just a year. The collection of statistics is a little more complete than it was last time, although all the gaps have not been made good, and some of the figures relate to the working of the previous twelvemonth. The number of authorized Gas Companies included in the return is 395, which is an increase of 11 on the total for 1887—a more than average rate of growth. The total authorized share capital of the Companies reached £41,309,978; and the loan capital, £9,741,514. The amount of share and premium capital paid up was £31,736,024; and of loans issued, £6,002,510. Of the gross authorized capital in stocks and shares, £11,163,940 was subject to auction clauses, of which £3,488,588 had been sold, realizing £1,517,902 in premiums. By the employment of this capital, £10,534,721 was earned for the year, at an expenditure on revenue account of £7,101,974. The volume of business done is represented by the carbonization of 6,050,588 tons of coal, and the production therefrom of 62,328,542,000 cubic feet of gas, of which 57,475,515,000 cubic feet were sold through the intermediary of about 13,615¼ miles of mains to 1,103,198 consumers and for the supply of 259,921 public lamps. The number of Local Authorities included in the separate return is 173; being an increase of five for the year—again a full average growth. Their authorized capital is £24,780,302, of which £21,333,833 has been borrowed. Their receipts for the year were £4,817,269, and their expenses £3,375,197; for which they carbonized 3,204,982 tons of coal, and made 32,381,124,000 cubic feet of gas—selling 29,547,773,376 cubic feet. The length of their mains is 7508¼ miles; the number of consumers reaches 1,089,748, and that of the public lamps 174,191. We have on previous occasions drawn special attention to the varying ratios of these data as they apply to Companies and Local Authorities respectively, and need not repeat calculations which can only vary by small increments and decrements from year to year. Taking the grand totals of the two descriptions of undertakings together, as representing in the briefest and baldest way the extent and value of the coal-gas industry of the United Kingdom, it will be found that £75,831,794 was, at the dates of these returns, authorized to be invested in the business. Of this sum, £59,072,367 was actually sunk, earning £15,351,990 for a current outlay of £10,477,171.

The total weight of coal made into gas was 9,255,570 tons, from which 94,709,667,000 cubic feet of gas were made, whereof 87,023,288,000 cubic feet were distributed through about 21,123½ miles of mains, and sold to 2,192,946 consumers, and for lighting 434,112 public lamps. Many highly interesting computations might be made with these enormous figures. But we shall not begin to do anything of the kind here for fear of outrunning our space; remaining content with thus drawing attention to the fact of the issue of the returns, and noticing their chief contents.

The Midland Association Meeting.

THE members of the Midland Association of Gas Managers met last Thursday in Birmingham for the transaction of their annual business, under the presidency of Mr. Henry Peaty, of Burslem. Mr. Peaty's Inaugural Address will be found in another column; and it is worth reading—having been evidently prepared with great care. It will enhance the author's reputation among his colleagues. The other technical business consisted of the reading by Mr. C. Meiklejohn of a valuable paper on Chance's sulphur-recovery process; and at the close of the formal portion of the proceedings, the members dined together at their new quarters, the Great Western Hotel. The attendance was good, and there was every indication that the Association had started well on a year of useful work under Mr. Peaty's supervision. The Association is very favourably situated for arranging object-lessons in practical engineering for its members. In Birmingham and the immediate vicinity there are numberless industrial establishments of a class that members of some District Associations of Gas Managers would have to go a good distance to see; while if the noise and dust of factories pall on the members, they have some of the finest country in England in their very midst. Taking it all round, it would be difficult to find more varied types of gas engineering than are represented among the members of the Midland Association, or more interesting meetings than this variety renders possible for them.

The Recent Exposure of the "Tipping" System.

THE recent remarkable disclosures relating to the wholesale practice of "tipping" adopted as the foundation of their business by Bell's Asbestos Company have not yet spent their effect. Some highly prejudicial correspondence was read in open Court (which could not be reproduced in the newspapers for fear of the law of libel), referring by name to many officials and employees of trading and industrial Companies of all sorts; and it is rumoured that more than one meeting of Directors has been held in consequence of these disclosures. Good people have raised their hands in horror at the corruption of the mercantile world thus revealed; but the Directors of Bell's Company appear to have taken matters very quietly. At the recent meeting of the Company, the Chairman referred to the trial, in which they had lost the day, and supported his declaration in Court that "tipping" was essential in the business methods of the Company. A paragraph relating to this subject was inserted in the course of the Directors' report; and shareholders were told that if they accepted the report they would become parties to this system. After some discussion and many protests, the report was adopted—as must be the case in such circumstances. We have yet to discover an instance of a successful dividend-earning Board of Directors turned out on a mere point of morality. This snap-verdict, however, leaves the matter precisely where it was before. A consent obtained by force is no consent at all; but even if every shareholder in Bell's Asbestos Company were joined with the shareholders of all the manufacturing and trading concerns in the universe in a declaration that "tipping" is justifiable and desirable, such an expression would have no moral weight whatever, neither would it satisfy consumers of the commodities forced upon them by these means. We do not know whether Bell's people permit the run of their own works to travellers interested in the sale of materials of which they are consumers for the purposes of their trade; but it seems, at least to an outside critic, that the less access sellers have to subordinates in the employ of their customers, actual or prospective, the smaller will be the field for these questionable operations. There must be some means of checking this poisonous system, which, unlike mercy, curses "him that gives and him that takes." Concentration of responsibility upon the fewest possible individuals, who must be sufficiently well paid to be able to recognize where their advantage lies, and should be admitted, wherever possible, to a direct share in the prosperity of their employers, is the only way to checkmate the prowling "tipper." Such agents would in most cases be too big game for him. Notwithstanding all that can be done in the way of precaution, legislation will still be desirable to enable those intermediaries between buyer and seller who abuse their trust to be punished, "for the encouragement "of the others."

The Water Supply of Italian Cities.—At a meeting of the Civil and Mechanical Engineers' Society, held last Wednesday, a paper was read by Mr. D. Fairlie Bruce on "Italian Water Supply." The author briefly described the works at Turin, Milan, Verona, Florence, Leghorn, and Naples; dwelling at great length on the points of interest involved in them. Of these the subterranean reservoirs at Capodimonto seemed most striking. They are excavated at a depth of 164 feet below the surface in the solid rock, and take the form of egg-shaped galleries; being connected so as to form separate reservoirs.

Gas and Electric Lighting Appointments in the London County Council.—At the meeting of the London County Council last Tuesday, Mr. A. E. Tanner was appointed a Gas Examiner in place of Dr. S. Rideal, whose resignation was noticed in our columns a few weeks ago. On the same occasion, Mr. W. Arnot was appointed an Inspector under the Electric Lighting Acts; Mr. A. Champion was entrusted with the supervision of the works of the Electric Lighting Companies in the public streets; and Mr. J. Somers was selected as caretaker and assistant to the Inspector at the electric testing station about to be established. The electric lighting appointments are not to take effect until the Highways Committee direct.

Reports of Gas Associations for 1889.—By an advertisement which appears elsewhere, our readers will see that the volume of reports of the proceedings of the various District Associations of Gas Managers for the past year is now ready for delivery. The transactions of the nine Associations which are now in active operation are fully recorded; and the formation of the latest addition to the number—the North Wales Association—just as the year was drawing to a close, is duly notieed. The papers read, with the discussions thereon, occupy 430 pages; the subjects dealt being illustrated by four plates and sixteen diagrams. At the end of the book there will be found the usual lists of office-bearers and members. The past year's work of the District Associations, as presented in this collected form, bears testimony to the intellectual vigour of these bodies, and shows that the members are quite in touch with all the more important questions upon which gas engineers and managers are expected to be informed. The book, as our readers are aware, is uniform in size with the Transactions of The Gas Institute, to which it forms a companion volume.

Fletcher's Manual of Gas Apparatus.—It is well understood by practical men that good trade catalogues are, in the hands of those who use them rightly, better guides for working purposes than formal text-books and manuals. For the instruction of the modern gas-fitter, for example, the best book is not a treatise on gas utilization, which must almost necessarily contain a great amount of ancient history, but an annual catalogue such as some of the leading firms are in the habit of issuing, which not only gives the principles of lighting or heating by gas, as the case may be, but also contains all necessary information concerning the apparatus and appliances actually obtainable for the purpose. It is not every price list, however fully illustrated, that can be trusted to impart sound information respecting the subjects of which it treats; the primary object of selling a particular make of article being generally paramount in the compiler's mind. Naturally, a trade catalogue may be expected to be partial in recommending the productions which it is intended to describe; but not much harm is done by this so long as the underlying principles are not misstated. Purchasers may be trusted to see that they get full value for their money if they are not deceived respecting the nature and quality of the article demanded, as they are, for instance, when a gas heating-stove of a common or even trumpery class is advertised by a fancy name, and palmed off upon the public on pretence of its having some mysterious virtues which not even the maker can explain. A good antidote to all this kind of poison, which is most mischievous in its effects upon the public mind, is a book like Mr. Thos. Fletcher's guide to gas fitters and users, entitled "Coal Gas as a Fuel." It is comprehensive and practical, and appears to be absolutely new. Mr. Fletcher very fairly explains the fundamental data of gas heating and cooking, and then proceeds to show how satisfactorily his own specialities meet the requirements of science and consumers' convenience. To this extent the book is a trade catalogue; but apart from this, it is full of genuine information for which most productions of a more pretentious class devoted to the same subjects would be searched in vain. Altogether, it is one of the most useful manuals of the kind we have ever seen, and can be confidently recommended.

WATER AND SANITARY AFFAIRS.

THE suggestion we made last week, that Mr. O. V. Morgan, having brought forward a Metropolis Water Bill in the present session of Parliament, would possibly repeat his performance of last year, has been quickly verified; the Bill in question being withdrawn on Friday last, after surviving its first reading by the brief period of nine days. This, occurring for the second time, seems very like trifling with the Legislature, especially as the Bill of this session was presented to the House in so defective a form as to imply a singular want of care in its preparation, to which circumstance we may attribute its speedy withdrawal. When the Bill first came into our hands, we found it, in consequence of its awkward framing, a somewhat puzzling document. It was entitled "A Bill for enabling the County "Council of London to introduce new supplies of water "into the Metropolis, and to acquire the rights of existing "Water Companies." We looked with peculiar interest to see where the new supplies were to come from, or how they were to be paid for; but there was not a word in all the Bill, except in the title, that made any allusion to this part of the question. We could only find a repetition of the clauses contained in Mr. Morgan's Purchase Bill of last year; and it was expressly stated that "this Act may "be cited for all purposes as the London Water-Works "Purchase Act, 1890." The phrase "for all purposes" occurred in the Purchase Bill of last session, which was itself a Bill substituted for one intended to give power for the introduction of "new supplies." It is surely time the promoters of the Bill knew how to present their measure in a complete form. We must suppose that they will, as last year, proceed to introduce another Bill, to take the place of the one withdrawn; and the question of "new "supplies" may be dropped, as before, or be more perfectly developed. We have never yet been enlightened as to how it is intended to proceed in furnishing a supply of water different from that already provided; neither has there been any financial scheme specifically mentioned, by which the requisite funds are to be raised. We may assume it has been contemplated to exercise the same powers of raising money which were proposed in the Purchase Bill—namely, by the Council borrowing such money as they may hereafter require, and for this object creating additional stock under the Loans Act of the late Metropolitan Board. This includes a provision for falling back on the Metropolitan Consolidated Rate to make good any deficiency in the sums available for the payment of dividends on the stock; the stock itself to be redeemed in 60 years. In all probability the next attempt on the part of Mr. Morgan and his coadjutors will be to introduce a Purchase Bill, pure and simple, in the same form as that of last year, including the clause which provides that if any profit accrues on the working of the water supply, after the payment of dividends on the stock and sustaining the redemption fund, the surplus shall be applied in reducing the charge to the consumers of water, "or, on the vote of the Council "in any year, in reducing the Metropolitan Consolidated "Rate." Last, but not least, this reduction of the rate comes in, and would no doubt be very distinctly kept in view, should the water-works account show any profit. On the other hand, if the Council are permitted by Parliament to try their hand at a new supply, we may expect to see the consolidated rate considerably increased. But the idea of competition is too monstrous to be realized, and can only be used for the purpose of intimidation. Falling back on the scheme of purchase, if this is to remain as before, it will give the Council a free hand as to the kind of bargain they are to strike. An extravagant sum may be offered in order to obtain possession of one undertaking, or "a part" of it. The transaction is to be "by agreement," which of course involves an inducement to one of the parties to it. The Companies must be loyal to each other in such a case; or the thin end of the wedge may be used against the majority with the most damaging effect.

The returns furnished to the Registrar-General by the London Water Companies, showing the average daily quantity of water supplied in each month, have recently been somewhat remarkable. The return just published for January, compared with the corresponding month of 1889, shows an increased supply to the extent of 5,186,411 gallons in the daily average. Despite this large increase, the supply from the Lea and cognate sources shows a falling off to the extent of 625,468 gallons per day. This makes the increase in the daily average in respect to the supply from the Thames as much as 5,811,879 gallons. If we go back a month further in each reckoning, we find a state of things which in one respect is still more remarkable. The average daily supply from the Thames and the Lea in December last showed an increase of 10,000,000 gallons compared with December, 1888. In that instance there was an increase in the quantity both from the Thames and the Lea; but very much more from the former than from the latter. In November last the daily average from all sources exceeded that for the corresponding period in 1888 by 6,630,000 gallons; and in like manner October had an increase of 8,408,000 gallons per day. If we recede another year in order to make the comparison, we seem to meet with a different order of things. January, 1889, compared with January, 1888, had an increase in the daily average of only 976,574 gallons. In December, 1888, the advance in twelve months was still less; being only 459,891 gallons. The increase in the number of houses, comparing each month with that of the previous year, in no way accounts for the recent growth of the supply. If we take the last three months of 1889, we find that the year's increase in the number of houses was much the same for each month; being a little over 12,000. In the last three months of 1888, the increased number of houses compared with 1887 exceeded 13,000. Yet there was no such development in the daily average of the supply at that time as we see now. If we take the normal supply at 220 gallons per house, we may make due allowance for the enlarged demand due to the spread of the Metropolis. But when we have done this, we find a considerable excess beyond that allowance in recent months. The excess in October last would be 5,692,000 gallons in the daily average; in November, 3,980,536 gallons; in December, as much as 7,333,225 gallons; and in January, 2,643,461 gallons. It would be interesting to know why the figures work out so differently when we recede in our retrospect. Comparing January, 1889, with January, 1888, the increase in the supply actually falls short of the increase due to the enlarged number of houses; the deficiency amounting to nearly 2,000,000 gallons per day. December, 1888, compared with December, 1887, shows in like manner a deficiency as great as 2,433,889 gallons per day. In November, 1888, there was an excess of 208,280 gallons per day; whereas in October the increase in the supply was almost exactly comparable with the enlarged number of houses. The broad result may be stated thus: That in the four months from October, 1889, to January, 1890 (both inclusive), there was an average excess of nearly 5,000,000 gallons per day beyond what would be required by the increased number of houses; whereas in the four corresponding months a year earlier, there was an actual deficiency to the extent of about 1,000,000 gallons daily. The figures must have a meaning, though it is difficult to understand what it is.

The Leslie Patents Company and the "Shaw" Gas Governor.—We are informed that the Leslie Patents Company, of which Mr. Henry Marlow is the Engineer and Manager, have removed from 178A, Oxford Street, to 41, Hart Street, New Oxford Street (near Mudie's Library), where they have fitted up a splendid apparatus for demonstrating to the public and to the trade the efficiency of the "Shaw" patent gas governor, for which they are London agents. This governor has taken one silver and two gold medals, and is becoming generally known, both at home and abroad, as simple in construction and very effective in its action. The Leslie patent cowls, patent Argand burners, and improved gas-fires are also commanding a large sale, and are daily on view at the new establishment.

The Luminous and Non-Luminous Radiation of a Gas Flame.—Sir J. Conroy, Bart., has lately presented to the Royal Society some observations on the amount of luminous and non-luminous radiation emitted by a gas flame. His experiments show: (1) That 3 millimetres of glass and 10 centimetres of water transmit a small portion of the non-luminous radiation of an Argand gas-burner, but that when the thickness of the water is increased to 15 centimetres, the transmitted radiation consists exclusively, or almost exclusively, of those kinds of radiation which affect the eye as light. (2) That, with the form of apparatus employed (a thermopile and galvanometer), there is no measurable difference between the diathermancy of pure water and of a solution of alum. (3) That the radiation from an Argand gas-burner consists of about 1·75 per cent. of luminous and 98·25 per cent. of non-luminous radiation.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 350.)

The Bank rate, which was raised on Dec. 30 to 6 per cent., was lowered on Thursday to 5 per cent. The Stock Markets have not as yet found much relief from this step, owing to a variety of causes, which cannot here be discussed without leading us too far astray from our own line. Suffice it to say that there is hardly any change from the preceding week. The Gas Market has been like the rest, and shows no increase of activity. Quotations have undergone hardly any variation beyond an advance of 2 in Gaslight "A." The absorbing feature of the week has been the issue of the South Metropolitan Gas Company's accounts. It goes without saying that they are not cheerful reading. War cannot be waged without the expenditure of much money; and however just may be his quarrel, the victor must find his success has been gained at some cost. Supplementing the admirable report of the Directors, the accounts show what the wicked strife forced upon the Board has entailed. Space does not permit of more than a brief note on some of the more salient points. Owing chiefly to an increase of about £44,000 in the cost of manufacture, strike expenses £30,350, and a reduction of £23,500 off the rental caused by the price of gas having been lowered (partly relieved by a gain of £6500 in stoves and residuals), the net earnings are about £97,500 lower than in the corresponding period of 1888. To meet in part the special strike expenses, £15,000 is taken from the insurance fund; and the dividend is to be reduced by £12,500. Undivided profits and the interest upon investments provide about £31,000, leaving a deficit of £22,000, which the Company's ample reserve fund will supply. We think the Board have dealt with their extraordinary expenditure in the right way; and we shall expect that, at the general meeting to-morrow, scarcely a dissentient voice will be heard, if, indeed, one at all. That the Company should have succeeded, in spite of all their difficulties, in making and selling about the same quantity of gas as they did in the corresponding half year, reflects great credit upon the management. In the Stock Exchange, nothing beyond a drop of 5 in the "A" stock resulted from the issue of the accounts. They seemed to require further consideration. There has been no incident calling for remark in Suburban, Provincial, or Foreign undertakings; and all quotations remain unchanged, except that Continental Union new has been put down to the level of the old shares. Business revived to some extent in Water; and prices generally have been firm, though Southwark ordinary is 1 lower.

The daily operations were:—Gas opened very firm on Monday, though business was limited. Gaslight "A" and Commercial old marked top price; but quotations did not move. Transactions in Gas were still more restricted on Tuesday; but general firmness was not abated, and Gaslight "A" rose 2. On the other hand, South Metropolitan "A" and Continental Union receded, as noted above. Wednesday brought no increase of activity in Gas; and business remained very quiet and featureless. The condition of the market on Thursday was just the same. Gaslight "A" was done at 246—the best price of the week. Gaslights continued to command good figures on Friday; but transactions were very limited. Saturday was rather more active than usual, but produced no change in quotations of Gas. In Water, Southwark ordinary fell 1.

ELECTRIC LIGHTING MEMORANDA.

The Sameness of Provincial Electric Lighting Orders—Mr. Flood Page on Electric Lighting and Gas Leakage—The Chelsea Electric Light Company's Meeting.

In summarizing last week the Provisional Orders relating to gas and water and lighting in general, we made mention of two typical applications to the Board of Trade under the Electric Lighting Act, remarking at the same time that we could not notice them all. There is in truth almost identity between all the different applications of this kind, which gives them a distinct aspect as compared with Gas and Water Orders or Bills. These latter are always local in character; and if there is much in all of them that is really the same, it is through a necessary observance of certain Standing Orders mainly relating to law and finance. The business in itself, whether of gas or water supply, which is the occasion of these statutes and ordinances, has always an individuality of its own. In the case of a gas company, the initial or maximum price fixed by Parliament for the gas may be the same as that allotted to another undertaking of the same class; but this is not primarily the reason why it is so fixed. We know that the initial price allowed to any gas company is calculated with reference to the actual circumstances, and the coincidence that gas companies in Cumberland and Cornwall may have the same price is purely accidental. From all the projects for electric lighting that now occupy the attention of the Board of Trade, however, there is a glaring absence of anything like local character—which is only another word for business. This need not necessarily have been so. When the leading London Electric Light Companies went before Major Marindin last year, they all had distinct notions of what they wanted to do, which gave them a recognizable individuality. These pending applications, on the contrary, with the uniform acceptance of the framework of the Model Order, and their confiding adhesion to the stereotyped maximum price of 8d. per unit, have no resemblance to projects that one can talk about as actualities. How do any of these promoters know that electrical energy can be supplied at a profit in a particular locality for something less than 8d. per unit? Nobody knows anything about it yet, in an ordinary business way; but it does seem odd that all promoters of Electric Lighting Orders should so confidently accept the same restrictions and regulations, while no two gas companies are situated exactly alike.

Mr. S. Flood Page is a gentleman who never keeps out of the correspondence columns of *The Times* for long. Now he is an electrician he gets a few gratuitous advertisements in this way by the neatest possible handling of any cognate subject that happens to occupy the public mind at the time, just as he used to do when he was charged with the interests of the Crystal Palace. Then he had a knack of working up the general topic of the amusements of the people; now it is the preservation of life and property from fire. Of course, as neither of the electrical companies with which Mr. Flood Page is connected undertakes installations or the wiring of houses, he is "quite impartial" in his attempts to allay the dread of disasters in connection with electric lighting that has been created by certain sensational reports from America. The way in which Mr. Flood Page slips in recommendations of the low-pressure system of electrical distribution without appearing to say anything unkind of high-pressure systems—he is an Edison man—is a real triumph of the artful letter-writer over an unsuspicious sub-editor. We have no sort of objection to Mr. Flood Page being allowed to "drive his own wheelbarrow" in this way through the columns of *The Times*. The poor old "Thunderer" has been "had" so many times of late, and its scientific and technical matter is habitually of such miserable quality, that an instance more or less of laxity of control is hardly worth notice. When, however, Mr. Flood Page is permitted to try to create a panic about the amount of leakage from gas-mains in the streets of London, and the consequences that may follow from putting leaky electrical conductors in the roadways, as is done with such disastrous results in New York, he ought to be pulled up. He goes to Haydn's "Dictionary of Dates" for 1860 to ascertain that "the escape of gas from the mains in London was 9 per cent.;" but if Mr. Flood Page has not learnt anything fresh on this and similar matters for 30 years, other people are not so simple. We cannot find space here to enlighten unprofessional readers as to the meaning of the term "unaccounted-for gas," and its amount for all London in 1889. Our professional readers will, however, be able to straighten the matter out for themselves should occasion arise; and meanwhile, as electrical conductors must manifestly leak in order to do damage in a gas-laden atmosphere, whether of street subsoil or elsewhere, we would only ask of Mr. Flood Page what better right electricians have to permit leakage from cables than gas makers have from mains.

The annual general meeting of the Chelsea Electricity Supply Company was held last week, when it was stated that the central station belonging to the Company had been open for business since the second week of last April, when the first 2000-lamp battery sub-station was started. Since this start, two other similar stations have been opened, and the plant for a fourth is in course of erection. By this Company's system the consumers are never in direct connection with the central station, but draw their supply from the secondary batteries at the sub-stations, which are charged as required from the central station by means of trunk conductors. In this way the consumer is less subject to sudden extinction of his light, and the irregularities of the generating plant are not visible in the lamps. But, on the other hand, every lamp takes a current made 60 per cent. dearer by the process of conversion by the batteries. It was stated that the batteries in use give out 70 per cent. of the power put into them, and up to the present show no signs of wear. A standing loss of 30 per cent. for storeage is apparently deemed quite satisfactory working. The cost of producing a Board of Trade unit of electricity has been found to range from 4¼d. in October, to 2¾d. in December; nothing being said of the summer months, when it must be considerably higher. It is doubtful, however, whether these figures are "practical;" one of the Directors admitting that they might be "a little increased." It was reported that the plant at the central station is equal to the supply of 75,000 lamps, which must be a long way ahead of present requirements. Before the meeting closed, the Directors obtained power to borrow £50,000 on debentures. Only £12,000 or £15,000 was reported to be wanted at once; but it is more than probable that the accounts of the Company will look very funny in a year or two, unless, meantime, they treble or quadruple their subscribers. It is difficult to perceive the elements of a paying business in this concern.

Gas Supply in Madrid.—Notwithstanding the high price charged for gas in Madrid (9s. per 1000 cubic feet), the sale, according to the correspondent of *Industries* in that city, continues to increase. He says that if the Company had had to supply the theatres (in which it is now obligatory to use the electric light), they could not have met the demand on them.

VAN STEENBERGH WATER GAS.

Some time has elapsed since we last mentioned the Van Steenbergh water-gas experiment at Knightsbridge; and our readers may therefore well be pardoned for entertaining curiosity respecting the present condition of this interesting scheme. So many trials of new systems of gas making never get beyond the experimental stage, that there is always a disposition on the part of technical observers to suspect failure when a fresh venture is not heard of for a time. So far, however, this is not the case with the Van Steenbergh experiment, which, whatever may be the ultimate fate of the commercial venture, is being managed in a highly creditable spirit. Mr. Van Steenbergh has said from the beginning of his undertaking to turn Humphrey's Hall into a gas-works, that unless he could succeed in convincing British gas engineers of the *bonâ fide* success of his method, and of its suitability for adoption in this country, he would clear out quietly, and retire to the United States. As repeatedly stated in these columns, we are always ready to accord respectful attention to any project brought forward honestly in this fashion; but, on the other hand, we have not the slightest patience with hole-and-corner schemes dressed up by nobody knows who, and puffed by equally unknown "experts." From the erection of the apparatus, the Van Steenbergh experiment has been carried on under the supervision of Professor Vivian B. Lewes, who made it a prime condition of his undertaking to report upon the system that he should have his own way in everything, according to the reasonable requirements of an independent scientific investigator. This liberty has been freely given; and now, after many weeks of experiment and observation both in the works and in the laboratory, Professor Lewes has been able to report in brief what this particular apparatus will do under existing conditions.

It is but right to remark that in deciding to create a gas-works in a Knightsbridge public hall, instead of at an ordinary gas-works, the Van Steenbergh people incurred some serious disabilities by way of compensation for the advantages of independence thereby secured. They could depend on having their own way and keeping their proceedings to themselves, as they could not have done if they had occupied somebody else's premises on sufferance; but, on the other hand, they incurred some regrettable limitations. They hardly knew what to do with their gas when it was made, and consequently could not run their generator continuously, so as to develop its highest efficiency. The force of this objection to the Knightsbridge establishment will be appreciated by a practical gas maker, who will also see in the capability of the apparatus for making a tolerable show under such conditions, one of its most valuable qualities. It is hardly necessary to remark that the ordinary process of coal-gas making could not be worked to any advantage at all in such circumstances, when production must be stopped for days as soon as the gasholder is filled.

The following is therefore a fair statement of the conditions under which Professor Lewes has had to inspect the Van Steenbergh process. When the gasholder described in our previous notice of the experiment was empty, he could set the producer to work with anthracite, oven or gas coke, and use the particular kind of carburetting material decided upon for the test, until the holder was full of the variety of gas desired, which he could then proceed to analyze and examine in any manner he might think fit. In this way a great variety of combinations of materials suitable for gas making have been essayed with highly interesting results, which Professor Lewes will make public at some future time. We are justified in saying that such an opportunity for the thorough examination of a water-gas process was never presented before to such a competent and independent investigator. Being perfectly conversant, among other things, with the duties of a Metropolitan Gas Examiner, Professor Lewes knew how to use the photometer and other tests upon this experimental gas as though it had been manufactured for sale in the ordinary way; and all his other investigations appear to have been inspired by equally practical considerations. He was, of course, on his guard against trickery as to weights and measures, if any such had been attempted—taking nothing for granted, but seeing, weighing, and gauging everything in and out of the apparatus.

When we described the experimental apparatus, in the Journal for Nov. 26 last (p. 1007), we remarked that the claim of the projectors was "to be able to put 22-candle gas into the holder, including everything, for about 1s. 2d. per 1000 cubic feet." This claim depended on the capability of this particular description of plant for making "22-candle gas with a consumption of 25 lbs. of anthracite coal and 2½ gallons of naphtha." It was shown at the same time that this performance would be about twice as good as the generally accepted average of American water-gas works. That is to say, that while repeating Mr. Van Steenbergh's claims, we did not believe he could support them. The information that has now come to hand from Professor Lewes's reports is, however, so surprising that we take the earliest opportunity for stating and comparing it with what has been claimed. He has found, as a matter of fact, that, working with Welsh anthracite coal and naphtha of 70° Beaumé, the best results of the Knightsbridge plant is the production of 1000 cubic feet of 20·5-candle gas for a consumption of 24½ lbs. of coal and 2¾ gallons of naphtha. This was for a run of a few hours and a total make of a few thousand feet of gas. Whether the better working of a larger apparatus continuously may be considered as likely to compensate for the presumably greater waste of handling by ordinary workmen instead of under test conditions, is not for us to say. At any rate, these are Professor Lewes's figures; and, taken as they stand, they are sufficiently noteworthy.

Anthracite is, of course, the best form of carbon for use in a water-gas producer; and it is quite possible that Welsh anthracite may be better for the purpose than American. Next to this hard coal comes oven coke; and then after a considerable interval follows gas coke, which wastes away more quickly in the strong blast during the process of "blowing up," and does not give the intense heat of the denser fuels. This experience only repeats what is very generally understood of foundry practice. Probably it will not be ascertained for how little gas coke 1000 cubic feet of water gas can be made until the generator is worked in a retort-house and charged with red-hot coke fresh from the retorts. It is quite reasonable also to suppose that the best form of producer for dense anthracite may not answer equally well for gas coke, and that experience may suggest modifications. It will not be far wrong perhaps to suppose that, making every allowance for the different characters of the material, 40 lbs. of gas coke ought to do, in a proper apparatus, what 25 lbs. of anthracite has done, according to Professor Lewes, in the Knightsbridge producers. At this rate, in many localities there would not be much difference in cost between anthracite and gas coke for water-gas making, for either would work out at about 3d. per 1000 feet.

Now we come to the hydrocarbon, which is really the *crux* of the matter, for the value of a few pounds' weight of carbon more or less is a comparative trifle. If 20·5-candle gas can be obtained from 2¾ gallons of naphtha, we were not far out from the original estimate. It would be safer to suppose, however, that, to make 22-candle gas in the holder, not less than 3 gallons of the hydrocarbon would be required. Even this we should prefer to take from the datum of a month's continuous run than from Professor Lewes's one-day test. Still, the authority given must be depended upon until it is superseded. With regard to the cost at which this material can be obtained, it is stated that almost any quantity can be purchased by special arrangement at 4d. per gallon in the Thames. We believe we are justified in stating that contracts for Russian naphthas, of from 76° to 70° Beaumé, can now be made at that figure. The commodity is not an ordinary commercial article in this country; there being no demand at all for it at the present time. It is described as the first runnings of the petroleum stills; being the lightest portion of the raw oil, which must be got rid of before the burning oil can be rendered safe. It is not rectified by any further distillation, and is of very little value on the spot, as it is only in limited local demand for washing grease out of wools, &c. Under these circumstances, it is believed that an export demand would be easily met at a diminished, instead of an enhanced value; the supply being practically unlimited, and the chief elements in the present export quotations being susceptible of reduction when a sufficient trade is organized. This is, of course, a question for the future. For the present, the price of 4d. per gallon has to be taken into account. The Van Steenbergh people contend that this naphtha is intrinsically worth more for gas making than the lower-priced Lima oil, of which so much is reported in connection with other water-gas systems, because it is cleaner, and makes a better gas in proper apparatus, such as they naturally claim theirs to be. Upon the data here given, the following estimate of the cost of making 1000 cubic feet of gas of from 20 to 22 candle power may be compiled:—Carbonaceous fuel (25 lbs. anthracite, or 40 lbs. coke), 3d.; naphtha, 3 gallons, at 4d., 1s.; labour and purification, 2d.; maintenance and interest on producers, 2d.—total, 1s. 7d. This estimate, it must be understood, is ours, and at least the last two items are open to correction. A deduction may be possible for ammonia recoverable; and the whole scale of working expenses and charges depends upon the scale of operations. This computed cost is very different from the estimate of 1s. 2d. per 1000 cubic feet put forward by the Van Steenbergh people, although the consumption of materials does not greatly exceed their promised performance. It is the naphtha, of course, which governs the problem. Supposing that residual ammonia reduces the estimate as above to 1s. 6d. per 1000 cubic feet in the holder, the question that arises is whether the gas is worth it in any particular locality—say, in London.

[Since the preceding paragraph was written, particulars of a run made late last week with gas coke and Russian naphtha of 40° Beaumé have been supplied by Professor Lewes. The total make of gas on this occasion was 3900 cubic feet, which required 250 lbs. of coke and 13½ gallons of naphtha. The corrected illuminating power of the product was 22·1 candles. The gas was made in two operations; the first "blow" and "steaming" being mainly serviceable in getting the producer well heated. The second run was naturally so much better than the first that the consumption of material was only after the rate of 35 lbs. of coke and 3 gallons 1 pint of naphtha per 1000 cubic feet; so that if the experiment could have been proceeded with further, even better results might have been expected. However, at this rate the cost of the 22-candle gas would be about 1s. 5d. per 1000 cubic feet, or equal to 11d. per

1000 feet for common London coal gas, taking relative illuminating power into account.]

It is a question of comparative advantages. First and foremost, in the lurid light shed on the conditions of gas making by the recent strikes, a system of gas making such as we have described simply appears to wipe out the labour difficulty. Only one-tenth the number of retort-house hands are required; and none of the remainder need be trained stokers. With coalies to do the charging, and superior workmen to manage the producers—above all, with the ability to make gas within an hour of starting the fires—the most pressing trouble of the gas manager vanishes. Then, as to the quality of the product, it is freer from sulphur than ordinary coal gas. Even when working with gas coke, without so-called sulphur purification, Professor Lewes reports the sulphur in the purified gas to be less than 9 grains per 100 cubic feet; and there is no carbon bisulphide. The bugbear of carbonic oxide is less terrible than might have been expected. When working with anthracite, at a high heat, Professor Lewes found the carbonic oxide something under 25 per cent., with carbonic acid at about 2 per cent. in the unpurified gas. If working imperfectly or at a lower heat with gas coke not of a very good description (having been handled several times), the proportion of carbonic oxide will sink to 15 per cent., while the carbonic acid rises to 9 per cent. The proportion of nitrogen is larger than in gas made in closed retorts. As already reported, the appearance of the gas is very white and brilliant.

It is rumoured that arrangements are in progress for the erection of a pair of Van Steenbergh producers in a London gas-works; and when this is done, the performance of the system with continuous working will be determined. The experimental results are certainly sufficiently striking to make this desirable.

WEST'S STOKING MACHINERY AT THE BECKTON GAS-WORKS.

An important example of the application of machinery to ordinary retort-house operations has just been inaugurated at the Beckton Gas-Works on a scale of magnitude that warrants something more than a mere passing notice. We refer to the adoption of West's drawing, charging, and coal-breaking and elevating machinery to retort-house No. 12. This is a stage-floor house, containing 45 through settings of nine ⏀ retorts in each, heated by generator furnaces, representing a total of 810 mouthpieces, the whole of which are to be charged and drawn by machinery. The general design and construction of the Beckton retort-houses is well known; and a full illustrated description of them will be found in "King's Treatise on Coal Gas," Vol. I., p. 135 *et seq*. Although the house and adjuncts were not specially designed for machinery, no difficulty whatever has arisen in the arrangement and fixing of the same; and the only structural alteration made has been the addition of some H girders, running longitudinally between the transverse girders that support the stage floor. They are so fixed as to come exactly beneath the rails laid for the traffic of the machinery, and thus to take the strains of the weight, which otherwise might at times be thrown entirely upon the cast-iron plates which form the stage floor. This retort-house forms the end of one of the two long lines of buildings containing the gas-producing plant at Beckton; and a small annex has been added at the blank end, for a purpose to be presently mentioned.

The entire system comprises the following plant:—Two boilers and two horizontal engines, with automatic adjustable cut-off, intended to be worked in duplicate. Either boiler and engine is, however, equal to the whole of the duty. Then there are eight coal breakers, elevators, and main hoppers, and six pairs of charging and drawing machines. The boilers are erected under the viaduct outside; while the engines are situated in the basement of the lobby connecting the retort-house with the adjoining one, and close to the exterior of the end wall. The motive power is transferred to the machinery by the medium of the steel wire-rope system as recently improved by Mr. John West, M. Inst. C.E. There are three pairs of machines for either side of the house, and each pair is driven by a separate rope. The main driving-shaft carries six pulleys, three at each end; and it is so arranged that it can be coupled or uncoupled at a moment's notice to either of the engines. A belt from each pulley passes up through the floor above to its respective shaft and corresponding pulley. Each shaft carries a wheel, round which the wire rope passes. The ropes are carried through apertures made in the end wall of the retort-house, right along the length of the house to pulleys at the far end. The bottom rope is twisted once round the driving-wheel of each machine, whilst the upper rope simply acts as a return. In order to maintain a proper degree of tension on the ropes, the pulleys at the far end are carried in a rectangular frame which is free to slide horizontally in a second frame. A chain attached to the sliding frame passes over a pulley at the back, and ends in a bar upon which flat circular weights can be hung. The tension on the rope is thus adjusted in a manner similar to that adapted to small telescopic gasholders. It should also be mentioned that a peculiar form of construction has been adopted for the driving-wheel which actuates the wire rope. In addition to the usual U-shaped groove round the periphery of the wheel, there is a second groove at the bottom of the first one, conical in section, with the wider part at the bottom. This groove is packed tightly with leather, so that the wire rope works upon leather, and not upon the metal of the wheel. This material is found to be capable of giving the proper amount of grip, and at the same time allowing a certain amount of slip, should any accident to the machinery render this desirable. A detailed description of the charging and drawing machinery has already been given in the Journal.* The coal breakers are arranged at equal distances, four on either side, and are situated in the lower part of the coal stores, so that the coal can be dropped directly into them from the overhead railways running through the house from end to end. Here the coal is broken into a size convenient for machine charging, conveyed into the overhead main hoppers, and supplied from them to the hoppers on the charging machines by gravitation, as desired.

The annex above mentioned is intended to receive the third set of machinery, as two sets will be found sufficient for working five or six hour charges in the ordinary manner. It therefore stands out of the way beyond the end of the stack, but ready to be brought into use at a moment's notice, if required, without entailing extra labour. Or if it is desired to work four-hour charges, the whole six sets can be brought into operation; the driving power being sufficient to work the whole at one time. This arrangement for working was introduced by Mr. G. C. Trewby, M. Inst. C.E., the Constructing Engineer to The Gaslight and Coke Company, as a means of meeting extra demands for gas in case of fogs, and also as providing a reserve in ordinary working. When working four or six hour charges, each set of machinery will be required to put in and draw out daily a maximum of 810 charges; or with five-hour charges worked with two sets, 1012 charges per diem.

Two sets of machinery, one on either side, are now in actual operation; and the completion of the whole is being proceeded with, under the superintendence of Mr. John West, jun., who is also watching the working of the machines. The retorts are furnished with circular mouthpieces, which are not so well suited to machine working as mouthpieces of section similar to that of the retort. Mr. West is proceeding with caution in the working of the apparatus; being desirous of showing its reliability and simplicity in working, rather than any astounding results in the way of speed. To this end he has introduced men who are quite fresh to the machinery; and at the time of our visit it was being worked by ordinary labourers who had not had any previous experience. Any man with sufficient judgment to "centre" the machines properly before the several mouthpieces in succession, might safely be trusted to work the machines. The charging is remarkably simple, as all that is required on the part of the operator is to turn a hand-wheel a few times in order to fill the scoop, and then to draw back a lever, when the scoop at once enters the retort, throws out its charge to the right, and returns to its place. On being again replenished, the hand lever (which automatically returns to its place when the scoop comes back) is pulled a second time, and the charge is carried in and delivered on the left side. As showing the simplicity of the apparatus, it may be mentioned that the writer was able to charge several retorts with the greatest ease; and it is specially worthy of notice that the alternate delivery of the charges—one to the right and the other to the left—is entirely automatic. The order of sequence, however, can be readily changed by the operator; and the charges are laid in with a degree of evenness that leaves nothing to be desired. The drawing machine, of course, requires a little more care in working, as the operator has to control both the horizontal and the vertical movements of the rake; but in this case a labourer who was doing his second day's work at the drawing-machine was working that appliance with fairly satisfactory results—showing that a very few days' practice will enable anyone to become an adept at operating the machines. In fact, a manager would find little difficulty in working a set of machinery himself, if the need for so doing arose. The highest rate of working here obtained with the new machinery, after a few days' practice, has been the complete drawing and charging of a batch of 24 retorts in 30 minutes. With a little forcing, from 70 to 80 retorts can be drawn and charged per hour; but under regular working Mr. West considers that one retort per minute is a fair average speed, as is now done at Blackburn and many other places by means of his apparatus. But he deprecates any endeavour to force the working with a view of showing a quick record; considering it more important to do the work thoroughly, and without strain or shock to the machinery, than to save a few minutes at each charge. The men know that they have a certain number of retorts to do, and that when finished they will be at liberty till next charging-time; and therefore they are not likely to dawdle over their work.

A notable feature about Mr. West's machines is the absence of vibration or shock. One may stand on the stage of the machine and fail to detect even the slightest tremor as the scoop or the rake, as the case may be, makes its stroke. In travelling from one mouthpiece to another, the start and stop are effected without jerk. It is scarcely necessary to add, remembering the means by which the machine is worked—

* See Vol. LIV., p. 68.

viz., the movement of a strap from a fast to a loose pulley, or *vice versâ*, the engagement or disengagement of clutch gear, &c.—that this result can only be secured by special means. Space will not admit of treating this point in detail; but it may be mentioned that in the case of the travelling gear it is secured by means of strong steel spiral springs.

New England Association of Gas Engineers.—The twentieth annual meeting of this Association was fixed to take place at Boston on Wednesday and Thursday last, under the presidency of Mr. R. B. Taber. Several interesting papers were promised for the occasion. Mr. S. J. Fowler was to discourse on the management of a small gas and electric lighting plant while Mr. F. H. Parker undertook to point out a few of the advantages which water gas possesses over coal gas for small works. The behaviour of illuminants during combustion and purification was to be dealt with by Mr. G. F. Goodno; and Mr. Waldo A. Learned promised to say something on the subject of the revivification of oxide of iron. The topics to be discussed, of which several in addition to those above named were set down on the programme issued by the Secretary (Mr Chas. H. Nettleton), were of a varied character, and such as would lead to the dissemination of information among the members. The proceedings at the meeting will be noticed at greater length in early issues of the JOURNAL.

Discovery of Coal in Kent.—In connection with the works which the South-Eastern Railway Company have for some time been carrying out at Dover in view of the possible completion of the Channel Tunnel project, the Chairman of the Company (Sir E. Watkin), who is also Chairman of the Tunnel Company, has been directing his attention to a search for coal at a point on the railway adjoining the experimental heading for the tunnel. The discovery of a bed of coal was announced last week by Mr. F. Brady, C.E., the Engineer-in-Chief of the two Companies, under whose directions the operations have been conducted. He reported that coal had been reached, on the 15th inst., at 1180 feet below the surface. It came up mixed with clay, and reduced almost to powder by the boring tools. A small quantity of clean bright coal found in the clay was tested by burning, and proved to be of good bituminous character. The seam was struck after passing through 20 feet of clays, grits, and blackish shales belonging to the coal measures, which, Mr. Brady says, lie at this point close under the lias; there being only a few intervening beds of sand, limestone, and black clay separating them. The correspondence of the deposits with those found in Somersetshire is thus pretty close; the difference consisting in the absence of the red marl at the Shakespeare boring. The lines of bedding in the shale are distinctly horizontal; and Mr. Brady regards this as an indication that the coal measures will probably be found at a reasonable depth along the South-Eastern Railway to the westward. In connection with this subject, it may be mentioned that the possibility of finding coal under London was suggested not long ago by Mr. W. Whitaker, F.R.S., a member of the Geological Survey; and, in view of the possibility of our sources of carbonaceous fuel diminishing, a large and influential Committee is now being formed to investigate the subject seriously.

Heating by Hot Water.—A useful series of articles on "Heating by Hot Water" was contributed by Mr. Walter Jones a short time since to the *Ironmonger*. These have now been reprinted, with diagrams and illustrations, in the form of a handbook published by Messrs. Crosby Lockwood and Son, and should be found very handy by those to whom information of the kind is valuable, whose numbers increase yearly. Sanitarians have succeeded in drawing attention to the healthfulness, as well as comfort, of a more equable heating of dwelling-houses in winter than the ordinary open fires are capable of affording; and there can be no doubt that hot-water pipes, heated by coke-fired boilers, placed in halls and corridors, and supplemented in rooms by gas-fires, would constitute a much more rational means of dealing with damp and cold than most houses possess. Mr. Jones tells all about Perkin's high-pressure system of hot-water circulation, in which the pipes form a closed circuit, and which was the original of a town heat-distributing scheme recently tried in the United States as something quite novel. It is now chiefly used in this country for heating ovens, muffles, &c., for trade purposes. The principles of low-pressure heating by hot water are described, although some of the details are not so clearly treated as could be desired. For example, the quickest, cheapest, and best way of jointing socket hot-water pipes—by Portland cement, either neat or mixed with a little borings—is not mentioned. The author discourages gas as a fuel for hot-water circulating arrangements. But it should be said that riddled breeze is the best of all fuels for most hot-water boilers; and gas companies would do well to keep a supply for this particular purpose. Mr. Jones recommends gas for cooking, and for heating small quantities of water; but he has evidently an imperfect idea of the extent to which this description of fuel is used in private houses and business establishments. It is his object, of course, to magnify the advantages of his favourite system of heating; and it must be acknowledged that he does this altogether in a very fair and rational manner.

TECHNICAL RECORD.

MIDLAND ASSOCIATION OF GAS MANAGERS.

The Thirteenth Annual Meeting.

The Annual Meeting of the Midland Association of Gas Managers was held last Thursday, at the Great Western Hotel, Birmingham, under the Presidency of Mr. HENRY PEATY, of Burslem. To-day, as on previous similar occasions, we give the full text of the President's Address, and an indication of the course of proceedings.

The first item of business was the confirmation of the minutes of the previous meeting, accompanied by an abstract statement of the accounts, and these having been read by the Honorary Secretary (Mr. J. S. Reeves), were passed without comment.

The Committee's report as to the proceedings of the Association during 1889 was presented, as follows:—

At the annual meeting held on Feb. 21, 1889, the President (Mr. Chas. Taylor, of Derby) delivered his Inaugural Address, in which he referred to the marked progress which had been made during the 35 years of his official connection with gas manufacture, the influence likely to be exerted over it by its competitors, oil and electricity, the questions of regenerative firing, carbonizing at high temperatures, increased production of gas by the decomposition of tar, and the advantages offered by machine stoking. The members next proceeded to discuss the paper read by the President at the previous meeting, on the subject of "Are High Carbonizing Temperatures Convenient and Profitable?" and the discussion was one in which many members took part.

At this meeting it was resolved to again supply the members free with copies of the "District Association Reports" for the year 1888.

The spring meeting was held on May 16; and the proceedings commenced with a visit to the locomotive works of the Midland Railway Company, at Derby, for which the President had obtained the kind permission of Mr. S. W. Johnson, the Locomotive Superintendent. The Works Manager (Mr. Holt) received the party, and conducted it over the extensive works, in which about 3000 persons were employed. The various processes connected with the building and repairing of locomotives were explained to the members, in all of which they were greatly interested.

Leaving the locomotive works, the party were conducted through the Litchurch works of the Derby Gas Company; and after a short interval for inspection and refreshment, the members were driven in coaches (generously provided by the President) to Matlock Bath. The weather being exceptionally fine, the drive of 17 miles through some of the most picturesque parts of Derbyshire was most enjoyable.

On reaching the Royal Hotel, Matlock Bath, the members assembled to hear a paper read by Mr. J. Ferguson Bell, on "Water Gas." The subject was dealt with in a most exhaustive and admirable manner, and was thoroughly appreciated. Time pressing, a paper on "Some of the Causes of Unaccounted-for Gas," by Mr. W. T. Tew, was taken as read; and the discussions on both papers were postponed until the next meeting.

The autumn meeting was held on the 18th of October, at the Grand Hotel, Birmingham, when the papers provided by Messrs. J. F. Bell and W. T. Tew for the previous meeting were discussed; and the discussions were highly interesting and important.

The election of officers was next proceeded with. Mr. H. Peaty, of Burslem, was unanimously elected President for the ensuing year. Mr. P. Simpson was re-elected Treasurer; and Mr. J. S. Reeves was re-elected Hon. Secretary. The other appointments were: Members of Committee in place of two retiring, Mr. C. Hunt and Mr. J. Deakes; Auditors, Messrs. Tew and Lewis.

The members were then driven to the works of the Compressed Air-Power Company, where they were received by the Consulting Engineer of the Company, Mr. J. Sturgeon, and the Resident Engineer, Mr. Abrahams. These gentlemen, while courteously conducting the party over the works, explained the various appliances for producing and distributing the air-power. Time unfortunately did not permit of a visit to any of the workshops in the city where the air-power was being practically applied, yet the visit to the works was felt to be an instructive one and full of interest to the members.

During the year five new members have been elected, while one has withdrawn. The number on the books is now 65; and there has been an average attendance at the meetings of 26.

The Committee think the work accomplished during the year bears ample testimony to the value of the Association; and there is every reason to hope that the interest and progress of the past will be sustained during the present year.

On behalf of the Committee,
HENRY PEATY, President.
J. S. REEVES, Hon. Secretary.

The only application for admission to the Association was from the Manager of the Ellesmere (Salop) Local Board Gas-Works (Mr. Edward Jones), who was unanimously elected a member.

A discussion thereafter took place as to the arrangements made for reporting the proceedings at the various meetings of the Association; but it was eventually agreed to leave matters as they stand—the opinion of the large majority of those present being that the course now pursued is generally satisfactory.

The preliminary business having been thus completed, the President proceeded to read the following

INAUGURAL ADDRESS.

Gentlemen,—Before making any remarks which may be of professional interest, I must tender my very hearty thanks for the honour you have conferred on me by electing me to be President of this Association. I can only regret that it is not in my power to make any adequate return. The responsibility is as great as the honour; and if you will consider the character and influence of the men who have preceded me, it is evident that it is no slight task to endeavour to maintain the prestige of the office. Even to men of ability and thorough knowledge, the task of preparing a presidential address increases in difficulty as the years pass by; for what subject is there—from the handling of coal to the fixing of a burner, through the whole range of carbonizing, purification, and distribution—that has not been

dealt with before, and by master hands? The ably-conducted journals connected with our industry supply us from week to week with any information that is of importance. Only a few days elapse from the publication of a patent in the Patent Office, to the published analysis and discussion of its value in our papers; every phase of the progress of invention is photographed and fixed for us; and the old and well-established facts are presented in fresh combinations. I must ask for your indulgence while I am attempting to deal with topics with which you are all well acquainted.

During the past year, many things have happened which compel us to examine seriously the conditions of stability of our gas undertakings. Our rivals, if they have not actually increased in number, have developed in strength and activity. Some of them may be passed by without much consideration; to others, we must give our respectful attention. The language used formerly in describing electric lighting, and in estimating its value and prospects of success, must be considerably modified. Many of the defects which have been pointed out in past years, no longer exist; and those that remain have the attention of accomplished engineers, who are exerting every energy to effect their removal. We can no longer speak of the impossibility of bringing the light down to an illuminating power that would be generally useful; that it does not admit of regulation; that it is variable and uncertain (I am now speaking of the glow lamp supplied from accumulators); and that the colour is more trying and wearying to the eyes. In many respects, it is a most beautiful light; and the way in which it can be adjusted to any portion of a room—ornamenting as well as illuminating—commends it to those who have a delight in beautiful adaptations, and who are not confined to the economical aspect alone. At present, it cannot compete with coal gas in economy; it is to some extent a light of luxury. But many people like luxurious appliances, and can afford to have them. There is such a thing as fashion. What is fashionable will be sought after; and, in many places, good and useful as gas has proved itself to be, and still is, the newer light will find a place. The gas will be removed, or relegated to the humbler offices of the house or mansion. Anyone who has money and taste enough to adorn his principal rooms with valuable pictures and other decorations, would not hesitate to illuminate them, wherever practicable, with the light that would least interfere with their valuable contents. I do not anticipate that this method of lighting will take a large proportion of the lighting business of the country; but it is almost sure to encroach somewhat on our domain, and we shall have to bestir ourselves to make good any loss that may occur.

The use of oil-lamps is extending; and though there is some inconvenience in the trimming, and some risk, many prefer oil-lamps to gas, on account of their soft and agreeable light. It is claimed for the oil-lamp that the light is cheaper; the wonderful improvement in burners enabling the consumer to get a most agreeable illumination at a moderate cost. The fittings have been improved to a remarkable extent; many of the designs of fittings, glasses, and shades leaving nothing to be desired in the matter of decoration. Many of these fittings are cheap; and, being portable, they are bought by consumers who would not go to the expense of gas-fittings in their dwellings. The way in which we may compete for the custom of this class of consumers will be dealt with farther on.

Of water gas—either used in manufactures, or in conjunction with oil gas for the purposes of illumination—I do not entertain the slightest fear. Whenever the conditions of the oil market allow gas to be made so as to compete with our ordinary coal gas, no one will be in a better position than ourselves to make use of it, and to supply it to the public. At present there is no firm of importers of oil who can quote a low enough price for either British, American, or Russian oil, to enable us to work it economically. When the supply of oil is sufficiently copious and low enough in price, we shall be able and willing to deal with this mode of manufacture.

The Van Steenbergh Gas Syndicate have practically demonstrated that it is possible to make a good, clean, and steady light from anthracite coal or foundry coke and a certain proportion of naphtha. It is stated that, under the best conditions, and with continuous working, the amount of good foundry coke would vary from 30 to 40 lbs. per 1000 cubic feet of gas made, carburetted with from 3 to 3½ gallons of naphtha. The illuminating power is said to be 22 candles; but on exposure to cold for two or three days, the illuminating power is reduced to 20 candles. The amount of carbonic oxide varies from 15 to 20 per cent. Plant (exclusive of buildings, gasholders, and mains for distribution) sufficiently large to supply from 200,000 to 250,000 cubic feet per day would probably cost from £3000 to £4000. For this system to be of real use to us as gas makers, we ought to be able to manipulate gas coke, and (as in the corresponding oil and water gas process) to be able to have a continuous and cheap supply of naphtha. A temporary success would be dearly purchased, if the employment of any large amount of naphtha were to lead to a considerable increase in the cost per gallon; and from what I know of the market, it is not probable that naphtha can be purchased in bulk at a sufficiently low price. As an auxiliary and improver of coal gas, this system and others may be of value; but nothing which has yet been laid before the public concerning them, would warrant any fear of serious competition with our present methods.

Interesting as the study of the processes of our competitors may be, it cannot equal in interest the study and contemplation of the incidents which relate to our own industry. Foremost among them stands the labour question. No one amongst us wishes in any way to minimize the importance of the services rendered by the men who are employed in our establishments; no one wishes that they should not be paid a fair day's wages for a fair day's work. It would be an anomaly, which none of us would wish to perpetuate, that while gas companies and corporations were aiding by their enterprise the prosperity of the people generally, the workmen in the gas factories should be insufficiently paid or cared for. While companies and corporations make large profits, the men in their employ should be well paid. The danger commences when fair wages having been offered and paid, the men do not also cordially co-operate for their employers' welfare; but endeavour, by injudicious combinations, to hamper and restrict the freedom of the employers. In connection with this topic I, for one, wish to tender to Mr. Livesey my thanks for the service he has rendered to every gas company and corporation in the United Kingdom, by the manner in which he has maintained the freedom of action of the employers, while offering substantial justice to the men. Many a town has been saved hundreds or thousands of pounds by the check he has imposed upon agitators, who would otherwise have been unbridled. We all cordially wish that no further difficulty will occur for a long time to come.

The result, however, of the increase of wages is now showing itself in our balance-sheets; and in some instances influences the cost of production of gas to the extent of 1½d. or 2d. per 1000 cubic feet. We must look upon this increase of cost as permanent, unless invention supplies us with means of reducing or replacing much of the manual labour.

The cost of coal—our staple article—has increased alarmingly. The gross coal has been in most cases advanced 50 per cent.; and there is no reason to believe that we shall ever again see the coal market so favourable for us as it has been during the past three or four years. It is not likely that we shall have such famine prices as obtained in the years 1873 and 1874; but everything seems to indicate that our coal bills will be permanently increased. The labour combination among the miners and others whose hands the coal has to pass through from the mines to our railway-sidings; the fact that as time goes on, coal becomes more expensive in getting; the constant and increasing demand, from the increase of population requiring warmth in their dwellings; the increase of machinery replacing hand labour, and as a consequence, requiring fuel for the production of power—all these conditions and requirements tend to enhance the value and the cost of coal. Our borough improvements in the matter of water-works and sewage-works, with their huge pumping engines, necessitates the increased use of coal. A steam-roller cannot be added to the appliances of our modern civilization but a further expenditure of fuel is required. And though we shall be recouped to a certain extent by the sale of coke and other residuals, we cannot hope to have our coals at the same net price as before. Making every deduction, we must anticipate an increase in cost of from 1d. to 2d. per 1000 cubic feet of gas.

A gloomy prospect! Yet we have a certain amount of satisfaction in the thought that these things tell against our competitors as well as against ourselves. Moreover, there are no compensating residuals in the processes of our rivals; so that the increments in cost may influence them more than they influence us. I will endeavour to show that the past year has brought, together with these burdens, some means, if we avail ourselves of them by which they may be lightened. Our efforts have always been made in the direction of economy of working, increase of illuminating power, and increased purity of our coal gas. I propose to touch briefly on the inventions and processes which may aid us in obtaining these desirable results. The Coze system consists in employing inclined retorts, fixed at an angle of about 30°; filling in the charge at the upper end; and, when burnt off, extracting the coke from the lower. Attached to the upper ends of the retorts are cast-iron tubes, of about the diameter of the interior of the retort, which are brought into line above the bed, and arranged to receive the charge from a travelling hopper, which can be brought over the mouthpieces, and, filling one retort after another, be used for the whole length of the retort-house. The momentum of the falling coals is sufficient to cause a flow of the material down the retort; this flow being stopped by a flat piece of iron introduced at the lower end. The first deposit of coal against this obstruction forms a stop for the next fragments, and so on till the whole of the charge is deposited. In order to empty the retort, the lower lid is loosened and put aside; the scraper-like stop taken out; a slice or spatula inserted underneath the coke; and, with a very slight amount of work, the coke is disengaged, and is precipitated upon the retort-house floor or, where stage floors are in use, to the coke vaults below. Thus the method is extremely simple. The rapidity with which the operation of charging is performed is extraordinary. Mr. Hunt has informed me that at Rheims three retorts were charged in 17 seconds; and I have myself seen a retort 20 feet long charged with 7 cwt. of small coal, the time, from the drawing of the slide at the bottom of the hopper to the deposit of the last particle in the retort, being only 5 seconds. The charge was as even as possible. Some doubts

naturally arise as to whether the retorts will behave well in actual practice. There must be some horizontal thrust in this inclined retort, and bulging in front of the setting may be anticipated. To obviate this, stronger buckstaves and iron crossbars are suggested; also studs or projections on the retort itself, at even distances in its length—the thrust being taken up equally by the cross walls in the setting. There is a decided objection to the cast-iron feed-pipes being imbedded in a mass of brickwork, on account of the difficulty in repairing them when cracked by unequal expansion. In practice, it would be preferable to have the upper ends of the retorts furnished with mouthpieces as in ordinary settings, and charge by means of a travelling hopper capable of moving vertically in a slide for adjustment to the different tiers of retorts, and horizontally to supply one setting after another. The enterprise of some of our English gas engineers will furnish us during this year with an opportunity of judging the system of M. Coze, both in its original form and with modifications; for at several works this process is being introduced. If all practical difficulties are overcome in its working, there is no reason why further developments should not be entertained. Carbonization of coals in bulk—so long a desideratum—will be brought near to realization. Charges need no longer be limited to 2 or 3 cwt.; a ton or more at a charge may be dealt with. The cost of labour will be very much reduced; and while we shall continue to pay well for such labour as may be required, the wages for each 1000 feet of gas made will be less than before the recent advance in the price of labour.

Giving every credit to M. Coze for the way he has elaborated his system, we must not forget inventors nearer home. Mr. Elliott, of Ludlow, has published his designs for continuous carbonization. A full description of these as adapted for a number of settings, was given in the JOURNAL OF GAS LIGHTING for Feb. 11. The method has not yet been adapted to through retorts of (say) 19 or 20 feet long, and thus would not be applicable to large works. At present, the retorts worked at Ludlow are 10 feet long, slightly inclined, having a fall of 1 foot in 10. The charge is put in at intervals of three-quarters of an hour; each small charge pushing forward the contents of the retort. The coke is discharged from a cylinder fitted at the other end. The mouthpiece fittings occupy more room than in any ordinary setting; and experiment has not yet been made with more than five retorts in one arch. Some objections—perhaps fanciful—may be made; but it would be unfair, until the system has had a trial on a good working scale, to say aught except in commendation of so ingenious a plan. One of our ex-Presidents, Mr. Hack, is giving the system a trial; and I sincerely hope it may prove a practical success. We cannot help admiring the ingenuity and painstaking which have been expended in bringing it into its present form. The labour required to work this system is very much less than in ordinary works.

Everyone must have read with interest the publication of the results obtained by the working of the Dinsmore process at Widnes. That these statements would not be passed by without question and severe cross-examination was not, in the nature of things, to be expected. The utilization of tar by the conversion of its hydrocarbons into permanent gas, has at some time or other been the object of every engineer anxious to make the best of the material which lay so close to his hand, and which obtruded itself—often disagreeably—upon his notice. But all attempts have, till recently, practically failed. When so much intelligence and ingenuity have been expended in vain, the strong presumption is that any efforts in the same direction will come to nought. But the fact that a large yield of gas of 19-candle power (one-third being made on the Dinsmore process) has been obtained from material which in ordinary working would give only moderate results, demands at least the careful consideration of everyone in the gas industry. With every deduction that can be made for the photometer used (a closed Evans, as against the bar in an open room), the inferior quality of the residual tar, and the extra fuel and interest on plant, the process seems to be a distinct advance in cabonization. One benefit derived is the ability at any time to secure full value for the tar, and thus compensate for any fluctuation in the market. Increasingly difficult as it is to procure good coal at reasonable prices, the certainty of being able to utilize the tar in this way would be the addition of a mine of wealth.

Having adverted to a system affording an increase of illuminating power at diminished cost, I now call your attention to another process of proved merit, which effects at the same time increased purity of our gas, and also increased illumination. I refer to Mr. W. A. Valon's method, as practised at Ramsgate. Since the reading of his paper in June last, further improvements have been made in the retorts containing the barium oxide. Cast-iron tubes are being used instead of steel; resulting in diminished wear and tear. Oxygen in a pure state has been proved to be vastly more efficient than air. Mr. Valon has demonstrated the system to be self-supporting—taking the least favourable view of the process. As other methods of obtaining oxygen have been suggested, I will give a few notes, taken from Watts's "Dictionary of Chemistry," on a process by which oxygen has been obtained from air, owing to the greater solubility of oxygen in water. One hundred volumes of water dissolve 4·1 volumes of oxygen at about 0° C.; but only half this quantity of nitrogen is absorbed at the same temperature. When air is compressed over water, the components of the atmosphere are taken up in direct ratio of the pressures employed. On releasing the pressure, there is proportionally more oxygen in the evolved gases; and this process repeated eight times results in a mixture having about 98 per cent. of oxygen. I give the table showing the amounts after each compression—

	Atmospheric Air.	Composition after Successive Pressures.							
		1	2	3	4	5	6	7	8
N . . .	79	66·67	52·5	37·5	25·0	15·0	9	5	2·7
O . . .	21	33·33	47·5	62·5	75·0	85·0	91·0	95·0	97·3

It would not be necessary in actual practice to go beyond the fourth compression. I have not gone into the question of the mechanical power required; but the fuel account would probably be far greater than in the case of Brin's process.

Another source of oxygen is by the electrolysis of water. The energy required to break asunder the molecules of water is enormous, as may have been expected, knowing as we do the great quantity of heat evolved by the combustion of oxygen and hydrogen. I learn from good authority that to produce 6000 cubic feet of oxygen in 24 hours by the electrolysis of water, would require 80-horse power to drive the dynamo, and that the price of a suitable dynamo would be about £400. This method may therefore be dismissed from our calculations; and we return to the apparatus of Mr. Valon in its present improved form, as the best and cheapest method of obtaining a supply of this gas.

I now call your attention to the work done by Mr. Bell, of Stafford, in supplying cottage houses with gas. His plan is to fix fittings free of cost, providing a meter with a special index to indicate each foot of gas as it is consumed. An extra charge of 6d. per 1000 feet is made to cover this outlay, and the extra expense of collection, which is made weekly. I do not feel at liberty to give the results obtained, as Mr. Bell will probably tell us further on how he has succeeded; but the returns up to the present are very encouraging. This plan is obviously the one to be adopted to meet the competition of oil; and a considerable extension of business may be anticipated.

There is no need for me to speak at length concerning the vast improvement in burners, as you have the most recent results embodied in the able address recently delivered by Mr. West, of Manchester.* I may mention that a gas engineer of my acquaintance has in several instances effected an exchange of old lamps for new ones, taking away a good modern oil-lamp, and replacing it free of cost with a Wenham or Siemens regenerative lamp.

I have mentioned several systems which, if adopted either singly or in combination, would decrease our cost of manufacture, and at the same time enable us to supply a better light. That some of these will be adopted speedily by many companies and corporations is beyond doubt. Self-defence will prompt us to adopt any system that will minimize the trouble and anxiety at present inseparable from the management of large bodies of men. It is safer to spend £20,000 on improved apparatus than to have it in reserve for a strike contingency. But the improvement is prospective, while the increased cost is with us. What is to be done?

At many places the price of gas is being raised—a proceeding which is to be deprecated in the strongest possible manner, unless rendered absolutely necessary in any particular case. A gas company, if they have no reserve fund, must either raise the price or submit to diminished dividends until better times enable them to pay off arrears. If the company have always done their duty to the consumers, by selling the gas at the lowest possible price, no objection can be made against raising the price, save that they are missing their chance of fully maintaining their sales, and even of extending them, while their competitors are compelled to raise the price of their articles. But in the case of corporations generally, there is no such justification; and I shall proceed to show that the efforts of corporation gas managers will give results of little value compared with what the corporations can produce for themselves.

It has been the policy of many corporations to largely subsidize the rates by the payment of a portion of the profits of their gas undertakings. Let us see how the abolition of this practice will affect the prosperity of our business. A gas undertaking passes from the control of a company to that of a corporation. The business is bought and managed for the benefit of the town. The moral obligation to the gas consumer remains the same; and in many cases the professed object when acquiring the business was to have such a control of the lighting department as to secure the extended use of gas at less cost—it being assumed that a corporate body would zealously watch and guard against any unnecessary expenditure. The legal obligation, however, has been omitted; and Parliament, while taking care that a company should not exceed a given rate of profit, lost sight of this important point when deciding the conditions of transfer from one body to another. Thus the price of gas is fixed to cover the working expenses of the establishment, the interest on the capital invested, the sinking fund, and a large bonus to the ratepayers. There are towns in which half the ratepayers do not burn gas; and yet these share in the profits according to the rateable value of their holdings. In the few succeeding remarks, the word "ratepayer" is used to define a ratepayer who receives a benefit from the profit to which he has not contributed; and the words "gas consumer," one who pays an excess rate for gas—a rate to which he would not be liable

* See *ante*, p. 108.

under a gas company. A man who receives as much from the redistribution of profit as he has contributed in his gas account, need not be considered, for he would not suffer under any system.

We will anticipate all the possible claims of the ratepayer. This aid to his rate is given in consideration of the risk he runs in the event of the undertaking not proving profitable, and becoming a burden on the rates. The ratepayer also claims that the Gas Committee, who occupy the place of the former Board of Directors, manage the works without receiving pay, and that he, having elected them for town business, has a right to an equivalent for their services. In many cases, also, when capital for extension is required, it can be borrowed at a less rate of interest than would be charged as dividend by a gas company; and the ratepayer claims that this difference in rate is due to him—the money having been borrowed on the security of the rates. This is reasonable; and the requirements of the ratepayer must be met in some way. But these items are easily calculable; and the charge for directors' fees and difference in interest can be passed to the credit of the borough account. The charge on account of risk depends altogether on the view we take of the stability of the undertaking. Those who think that the business is safe for the next fifty years have no claim whatever on this item; for the sinking fund provides for the total extinction of the original capital at the termination of that period. But supposing the period to be too long, and considering that the market value of their property is less (owing to competition from electricity or water gas), it is therefore expected that an additional sum should be paid in order to cover this risk. Nothing is more certain than that it ought not to be handed over to the ratepayer. The more his risk, the less he ought to be paid cash down. There is only an obligation to increase the sinking fund, and by augmented payments to decrease the period of responsibility. Bear in mind that any payment made direct to the ratepayer does not diminish the risk in the least degree. Moreover, a fallacy is involved in the use of the word "ratepayer;" the ratepayer of to-day is not the ratepayer of to-morrow. There is not the slightest guarantee that those who have been the recipients of the bonuses will remain to pay the share of the losses. They may go out of the district or go out of existence; and the corporation in difficulty with its gas finance will invoke in vain the shades of the departed.

The anomalies of the case (always great) assume grotesque proportions when the recent action of certain public bodies is taken into account. Some corporations, eager to deprive electric companies of a chance to make money in their district, have put down plant to supply electricity. But the works do not pay; and the profits of the gas-works are called upon to make good the deficiency. The gas consumer pays for his own gas, pays a portion of the cost of the electric current to his neighbours' lamps, and out of the superabundance of his wealth, pays a part of the rates of the man who prefers electricity. The scheme of endeavouring to obtain fresh custom from cottagers, by free fittings and weekly collections, does not appear to be so inviting when we consider that the poor man's pence on the present system are collected to make a donation to the users of electricity, who, boasting in their light of luxury, are certainly well able to pay for what they want. Only when the cottager knows that the article, good as it is, is offered on the best and most businesslike terms, without extra charge for his neighbours' benefit, is he likely to fully reciprocate the kindly intentions of the gas department.

We have to inquire whether the risk is properly met by the sinking fund usually provided. In looking over the returns of the corporations in the midland district, I find that the periods for repayment vary from 30 to 80 years; the period in most instances being about 60 years. Imagine the difference there will be in the position of these undertakings in 30 years from now. One will be able to supply its district with gas at cost price, free of capital and sinking fund charges; the charge for committee management being the only one left which the ratepayer can claim. Another undertaking will have its heavy permanent charges on capital and interest. I think the ratepayer may fairly urge that the time is too long in most instances. It would be advantageous to the gas consumer to meet this additional obligation by making such an augmentation of the present sinking fund as would allow of the extinction of the capital account at the end of 30 years.

A numerical example may make this clearer. Suppose a corporation gas undertaking, with a capital of £100,000, repayable in 60 years, principal and interest, allowing 3½ per cent. compound interest. The required annual payment for interest and sinking fund, would be about £4010 per year. For extinction in 30 years, the amount would be about £5437 per year. This gas undertaking would probably have a sale of 120 million cubic feet; and, at a charge of 3s. 4d. per 1000 feet, contribute £4500 per year to the general fund. This sum represents 9d. per 1000 feet of gas sold. The extra amount paid to the sinking fund would absorb 3d. per 1000 feet; leaving 1d. per 1000 feet for committee management, and 5d. for reduction in the price of gas—making the net price 2s. 11d. No further claim being possible on the part of the ratepayer, gas as an illuminant would be put before the public on its merits. Can there be any doubt as to the more rapid extension of the business at the lower price? When increased sales are made, the charge per 1000 feet will decrease; and gas will soon be used with advantage by all classes of the community. The price of gas will be influenced far more by such a process than by any carbonization or purification improvements. Any new system of manufacture that will secure for us one penny reduction per 1000 feet in the cost of production, is rightly considered a great achievement; but many such reductions in the price charged would naturally result from allowing the sale of gas to have fair play. At the termination of this shortened period, rival systems would be left far behind. For heating, lighting, cooking, and for industrial purposes, the use of gas would be indefinitely extended.

I hope that the work of the Association this year will be profitable to us all. In these stirring times, there are many questions awaiting settlement. Could the energies and funds of this Association be better employed than in obtaining further information respecting some of the projects to which I have alluded, and in settling the value of them to our industry? If we could obtain independent analysis of the gas and other products by the Dinsmore process, a report of the practical working of the Coze and Elliott systems of carbonizing, further information respecting the fixed sulphur in lime when acted upon by oxygen as in Mr. Valon's process, and the possibility of the utilization of the same, we shall have done work of an interesting and profitable kind.

On the motion of Mr. C. Taylor, of Derby, seconded by Mr. P. Simpson, of Rugby, a hearty vote of thanks was passed to the President for his useful, able, and suggestive address.

The President then called upon Mr. C. Meiklejohn to read a paper on "Chance's Sulphur-Recovery Process;" and a highly interesting contribution to the records of the Association was the result. The paper and diagrams exhibited will appear in due course. It was resolved, on the motion of Mr. H. Taplay, of Stoke-upon-Trent, seconded by Mr. C. Hunt, of Birmingham, to postpone the discussion of the paper till the next meeting. The President, in putting the motion to the meeting, expressed his agreement as to the advisability of deferring the discussion, so as to allow the members an opportunity of examining the various formulæ contained in the paper, and considering the bearing of the process described on the ordinary routine work of gas manufacture.

This concluded the business meeting; and the members afterwards dined together.

Death of Mr. W. Bates, of Worksop.—By the death of Mr. William Bates, which occurred on the 14th inst., the Worksop Gas Company lose the services of an old and trusted employe, whose place it will be difficult to fill. Mr. Bates was 71 years of age. He had held the position of Manager of the Company for 35 years, discharging his duties with great energy and ability.

Death of Mr. G. A. Northover.—We regret to record the death, on the 17th inst., in his 67th year, of Mr. George Augustus Northover, whose name will be familiar to many of our readers from his connection with several gas companies. We believe the deceased gentleman was a few years since upon the Board of the Malta and Mediterranean Gas Company; but relinquished the position on account of ill health.

Mr. W. Key's System of Warming and Ventilation.—On Friday, the 14th inst., his Grace the Duke of Argyll formally opened the Victoria Infirmary, which has just been erected in the Queen's Park, Glasgow, to meet the wants of the inhabitants of the south side of the city. The event requires notice in these columns from the fact that the whole of the rooms, wards, and corridors in the building are heated and ventilated by a system devised by Mr. W. Key, the Engineer of the Tradeston station of the Glasgow Corporation Gas-Works, who was entrusted by the Board of Governors with the duty of preparing the plans and specifications for this portion of the work. It appears that it was not until considerable progress had been made with the building that Mr. Key's system was determined upon; but although the difficulties of carrying it out under such conditions were necessarily increased, they were all satisfactorily surmounted. The system is now working so effectively that the whole of the building can have the air expelled from it, and be entirely refilled with fresh air, in the space of eight minutes. As this requires 50,000 cubic feet of air per minute, the benefit can be readily understood. The heating apparatus has not yet all been applied simultaneously; but this enormous volume of air has been continually passed into the building properly tempered and warmed—the temperature having been raised from 33° to 68° Fahr. The system of ventilation adopted is the "Plenum," which is based on the principle of air propulsion. It has been already employed in the University Buildings in Dundee, as well as in several Board Schools in Aberdeen; but certain modifications had to be introduced by Mr. Key to make it suitable for the Glasgow Infirmary. At the opening ceremony, Mr. Lorimer made special reference to the warming and ventilating arrangements of the building, and, while complimenting Mr. Key upon them, spoke in appreciative terms of that gentleman's devotion to the interests of the Infirmary, to the completion of which he had sacrificed much of his leisure for many months. He thought this could not be too heartily acknowledged. It should be added that Mr. Key is one of the Directors of the Infirmary; having been elected by the workmen contributors in the various public works of Glasgow.

SOUTHERN DISTRICT ASSOCIATION OF GAS ENGINEERS AND MANAGERS.

The Adjourned Discussion on Mr. Methven's Paper.

In the JOURNAL last week we published a general report of the proceedings at the annual meeting of the above Association, held at the Hôtel Métropole on the 13th inst. Owing, however. to want of space, we were compelled to hold over the report of the interesting discussion on Mr. J. Methven's paper on "Photometry," read at the previous meeting of the Association. This we are now able to give.

The PRESIDENT, having reminded the members of the paper, said they were all of opinion that Mr. Methven had rendered great service to the gas industry generally by bringing his paper before the Association. In the matter of the variations in the atmospheric conditions, he had shown some of the causes of the unsuccessful tests which were at times recorded. On one day the gas would be found above the standard; while on another, gas manufactured in precisely the same manner, for no apparent reason, would be much below the standard. He hoped there would be a good discussion.

Mr. A. G. VERNON HARCOURT said that he had not had the advantage of hearing the paper on the previous occasion, or the discussion which followed it; nor had they that day the advantage of the diagrams (as reproduced in the print of the paper) which he supposed Mr. Methven then showed. However, he had read through the paper with considerable interest in the columns of the JOURNAL OF GAS LIGHTING; but it was such a long one, and embraced so many points, that it would be impossible to deal fully with it. There were one or two matters perhaps which he was almost bound to notice, because the paper not only contributed to their knowledge of photometry, but it contained something in the nature of an attack upon the conduct of himself and his colleagues as Gas Referees. Mr. Methven had remarked that in the constitution of the Gas Referees, it was provided that "two shall form a quorum; so that it was quite possible for one of the three to be in the minority. Conflict of opinion was anticipated here." He (Mr. Harcourt) asked whether it was not a common arrangement, where a body consisted of several members and had to act officially, for the number forming a quorum to be named; but such naming of a number to form a quorum (some number less than the whole) did not imply that there would be conflict of opinion. The naming of a quorum contemplated that some of the number might be absent; and it allowed a part to act for the whole. There was no such conflict of opinion as the writer of the paper supposed. Mr. Methven referred to the frequent statement in the Acts of Parliament determining the duty of the Referees that it was their business to "certify the mode" in which certain things were to be done; and he said that this implied that it was not their duty to deal with the actual instrument for indicating the illuminating power of the gas. This contention was hardly maintainable in the face of the express words of the Act of Parliament—that the Gas Referees were to determine the number and positions of the testing-places, and were from time to time to prescribe what apparatus was to be used therein for testing the illuminating power of the gas. With regard to the Referees, or one of them, having a practical knowledge of the manufacture of gas, Mr. Methven interpreted this very reasonable requirement as to the constitution of their body as meaning quite a different thing—viz., that one of their number "ought to take the Gas Companies' side." Now that was not the view the Referees had taken of their duty; nor was it a right view to take. They had to be "competent and impartial persons;" and they had endeavoured, and he hoped they had succeeded in making themselves acquainted with the matters they had to deal with. He believed they were also impartial. There was certainly nothing in their positions which would incline them to be partial against the Gas Companies; on the contrary, the natural impulse was the other way. He had many opportunities—like that which he then enjoyed—of mixing with those whose business it was to manufacture and supply gas; and he was pleased to say he had many friends among them. Was it likely that anyone in such a position would be less sympathetic with those who were engaged in a process of so much scientific interest as that of manufacturing gas than with that unknown and characterless person—the gas consumer? But the Gas Referees would not be a body of "impartial" persons if they took the one side or the other. As to the changes that had been made in photometers from time to time; the object which it was sought to accomplish was very clear. There were all sorts of photometers, which had been devised by the ingenuity of various makers; and that which a good photometer aimed at accomplishing was to obtain the best and most exact comparison possible between standard candles burning under ordinary conditions and the light under examination. It had been the whole aim of the Gas Referees, in any alterations they had made in the form of the photometer, to bring about the most exact results possible in the work of testing. They had to deal with a standard which was uncertain under fixed conditions, and which under different conditions had very different values. It could not be otherwise than that those who were occupied and interested in an operation so difficult as the comparison of candles with gas consumed in the standard burner, should from time to time, as their knowledge increased, introduce improvements for the better and more exact performance of that operation. For example, there was a change that Mr. Methven had discussed—the means that had been introduced for keeping the axes of the flames of the candles exactly in a plane perpendicular to and passing through the zero of the scale. In the candle-photometers used hitherto this rather necessary provision had not been made. The closed or Evans photometer was a comparatively new instrument some 17 or 18 years ago, when he began work as a Gas Referee. It was originally constructed for the purpose of satisfying a Vestry who desired to test the illuminating power of the gas supplied to the street lamps. The box form of this instrument was arranged so that it could be used in the open air with a street-lamp, and testings made on the spot. Mr. Evans adopted this photometer for use under other conditions; but unfortunately in constructing it there had been several alterations made. Two of the most important alterations were: (1) The candles were made to move backwards and forwards, instead of the disc being moved, as was the case in the older photometer; and (2) the screens which had been used to cut off reflected light were omitted. The "Tower" photometer was a kind of compromise between the box photometer and the open photometer; and it was introduced because it was thought that gas examiners might be a little abrupt in their movements, and it was necessary that more protection should be given to the candles than was given by the screens of the open photometer. This photometer they owed to the ingenuity of Mr. Sugg. As far as he (Mr. Harcourt) had been able to observe, the candles and the gas seemed to burn very steadily and under normal conditions in this photometer. In regard to the length of a photometer, he agreed that rather a longer photometer than a 60-inch bar was desirable; but when the change to the 100-inch bar, was adopted, only a portion of the 100 inches was ever used—the consequence being that only a comparatively small advantage was gained by the use of the longer scale. Using two candles, the distance between the portions indicating 15 and 17 candles was, in sixteenths of an inch, 17·8 on the 100-inch bar, and 11·7 on the 60-inch bar. Extending the scale did not diminish personal errors. The position of equal illumination having been found, it was easy on any scale to read accurately the position of the pointer. With regard to the size of the chimney which was used in testing, the Gas Referees were responsible at one time for the prescribing of the burner that was to be employed. But the burner had now been fixed by Act of Parliament; and it was not a question for the Gas Referees whether or not they should prescribe a smaller chimney. The author had found that the photometer at the Lambeth Road testing-place gave a result 4·3 per cent. lower than the photometer at the works. The bulk of the difference in the results was found to be due to the form of the end board and its distance from the burner. "In the one case the gas received the advantage of the reflected light from the end board, which in the case of the other photometer it did not. . . . Moving the board and altering its form dissipated the reflected light to a great extent." The difference between Mr. Methven and the Gas Referees was clearly presented in this example: That moving a board, which was only 7¾ inches from the burner, and altering its form, dissipated the reflected light to a great extent, was a reason for making these changes if the object were to estimate truly the light given by the flame; but was a reason for not making them if sources of error ought to be retained which assigned a higher value to the gas. According to the latter view, such changes meant "a considerable blow aimed at the Gas Companies," who were represented as having a prescriptive right to the maintenance of faulty apparatus. It was well known that with 5 cubic feet per hour of gas of less than 16-candles value, the "London" Argand gave more light with a chimney of less than 2 inches diameter. The observations which were quoted as revealing this fact were a comparison between the results of burning such gas (1) at 5 cubic feet per hour, and (2) at such a rate as would yield a light of 16 candles, with a correction in the latter case for the increased rate. These observations related to a point of much importance. With the "London" Argand, if the consumption were reduced by one-fifth, the yield of light sank to about one-half; and, from the same causes, if the actual quality of the gas were somewhat low, the yield of light with a consumption limited to 5 cubic feet per hour was greatly reduced. Thus any deficiency in the gas was much exaggerated. A more just estimate would be formed by setting the light of the burner equal to 16 candles, and observing the rate of consumption. This should not be lost sight of in any future legislation touching the mode of testing the illuminating power of gas. The following passages relating to the combustion of gas in the "London" Argand seemed to require correction:—"The principle of the burner" is "such that, as the length of the flame is reduced, so the quantity of air inducted by the chimney to the flame increases." The reverse was the case. The chimney of the "London" Argand, like other chimneys, drew in more air when there was more combustion, and consequently a more heated column of gas, within it. "The lower the quality of the gas, the more air is brought to exert its influence upon it." Less air was brought in; but it bore a larger, and an unduly large, proportion to the amount of carbon and hydrogen to be burnt within the chimney. The production of heat within the chimney by the combustion of 5 feet per hour of 16-candle

gas, and the volume of air that was drawn in, was not less "under a low barometer and a high thermometer;" and a high atmospheric pressure would tend more than a low pressure to "the production of a brownish-coloured flame." Dr. Frankland had made experiments on this point which were interesting and conclusive. Mr. Methven offered these observations as evidence "that the burner does not develop the full light of the gas at all times." What was to be understood by "the full light of the gas?" Our views on the subject had been greatly extended by the invention of the regenerative and incandescent burners. The diagrams and comments which purported to show that in only one out of several positions, all complying with the "Instructions" of the Referees, were the candles rightly placed upon the bar, rested upon the two assumptions, that a difference had been established between the amounts of light sent forth from the two edges of a candle-flame, and that the mean light of the flame was the average of its flat sides and of its two edges. The difference of 1·2 per cent. between the values of the edges was almost too small to be taken into account, considering the great difficulty of such observations with candles; and the average light of a flat flame was certainly not represented by the mean of the edge and of the flat side. It was greater than this. Very little diminution in the light of such a flame occurred as it was revolved, until just as it became end on. But, whether or not these observations should affect the practice of candle testing, they seemed to be in themselves of considerable interest, and the fruit of much careful work. The variation in the light given by candles at different temperatures was most remarkable. At 50° the developed light for 120 grains of sperm consumed was 1·198 candles; at 72°, 1·041 candles—*i.e.*, the candles tested gave in a cold room nearly 20 per cent., and in a warm room 4 per cent. more light than a candle ought to give. Compared with such variations as these, the variations due to the position of the edges of the candle-flame were very small matters. Mr. Methven's numerous and careful experiments on the influence of atmospheric moisture were also well worth placing on record. But though it might be found possible to improve the constancy of a standard source of light by supplying it with artificially dried air, it seemed necessary that the coal gas should be tested when burning under conditions similar to those which existed in the houses of gas consumers.

Mr. H. Leicester Greville said, as time was rather short, he would confine himself to a very few observations. First with regard to the action of the ordinary chimney used in official gas gas testing, he said there was no doubt that the strict adherence to the consumption of 5 cubic feet per hour did not do justice to the gas supply when it was not rigidly up to the 16-candle standard. He had found that, with the orthodox 6 in. by 2 in. chimney, gas which gave a return of 14 candles at the 5 cubic feet rate of consumption, indicated, when the gas was turned up to smoking point, and the consumption calculated back to 5 cubic feet, a value of 15·4 candles. Then with regard to the effect of temperature, Mr. Methven attributed most of the variations he obtained in his experiments to the increased capacity of air at high temperature to retain aqueous vapour compared with air at low temperature; but he (Mr. Greville) found that the varying capacity of the water in the experimental meter for absorbing hydrocarbons from the gas at different temperatures had also to be taken into consideration. He had made several experiments in regard to this question of temperatures. In one, the temperature of the gas was 46°, and the light was 15 candles. When the temperature was raised to 66°, the light was 15·7 candles. On another occasion, by the increase of temperature from 46° to 71°, the light rose to from 14·4 to 16·7 candles—an increase of 2·3 candles. He had tried separate experiments in which the air alone was heated, and found very little difference; but when the water was heated in the meter separate from the air, he found a large increase of light. He had read Mr. Methven's paper with great interest, because he believed it was the first contribution they had had which touched upon the important effect of atmospheric variations. They had had all sorts of articles and papers on the subject of standards of light; but, as far as he was aware, none of them had touched upon this particular aspect of the question. Accepting Mr. Methven's figures as to the actual difference which moisture in the air made on the light of various illuminants, they ought not to be unduly alarmed, because after all the absolute error was a differential one. The experiments depended upon the use of perfectly dry air on the one hand, and perfectly saturated air on the other. The absolute error in conducting a test would obviously be the difference in the error. If they obtained roughly 9 per cent. in an amount of moisture on an Argand, and 10 per cent. error on a pentane flame, the absolute error would be 1 per cent. difference between the two. If it was found in practice that the effects of atmospheric conditions were really serious, he suggested that a table of corrections should be worked out to apply to moisture for varying temperatures.

Mr. W. J. Dibdin (London) said he should like to refer to a point which had received very prominent attention in Mr. Methven's paper; and that was the question of candles. Whether they turned the candles this way or that way, or if they had them in this or that direction, they realized different results. There was no one in the room who was not perfectly satisfied that, whatever way the candles were turned, various results were obtained. He would take the opportunity of urging upon everyone who had any influence in this matter, to direct parliamentary opposition to the revival or regeneration of candles in any form. Candles were relics of the past; and they must exert themselves to the utmost to secure their abolition for testing purposes, and to bring about an alteration of the law. As to a new standard, he knew of nothing better than the one devised by Mr. Harcourt, though it might not be the most practical unit for general work. They ought to have a standard for revision deposited, the same as the platinum bar or the standard weights and measures.

Mr. Methven, in replying upon the discussion, said the first thing he had to do was to congratulate the Association upon having learned and scientific gentlemen present to give their views on the important question of photometry. He must thank Mr. Harcourt for the very lenient manner in which he had dealt with the severe criticism he (Mr. Methven) had made in the paper in regard to the actions of the Referees. In comparing his experiments with those of Professor Tyndall and Dr. Frankland, he was afraid the wording of the paper was not quite clear. He (the speaker) conducted experiments on candles; and found, at high temperatures, they gave a less development of light than at low temperatures. Professor Tyndall and his colleague discovered that the light developed by candles on the top of Mont Blanc was lower than at the base. His experiments followed the same direction; and he attributed the results he obtained to the high-temperature air containing more aqueous vapour to be consumed than that at the low temperature. Mr. Harcourt was not quite clear with reference to his (Mr. Methven's) remarks on the development of the light of a candle flame in different positions. He had an inferior standard of light to judge them by; and he assumed that this inferior standard of light was equal to one candle. He wanted to explain that the development of the light of a candle flame varied according to the position exposed to the disc. The flat flame of a candle gave a higher development of light when exposed to the disc than its edge. He stated in the paper that a candle possessed a flat side as well as an edge—the same as the flame from an ordinary flat-flame burner, but not to the same extent. By his experiments, he had found that when the wicks were bending towards the disc, the light developed was less than when the wicks were bending from the disc. Therefore he concluded that the only position that they could use candles in to give their average value was that marked No. 5 (see fig. 4 in the paper). Mr. Leicester Greville said they ought not to be misled by the figures he had quoted in the paper; they were merely results of experiments he (the speaker) had made. In the experiments he had carried out throughout his career, he had always experienced great advantage from working by extremes—he took the extreme measures in an experiment; and he often found it was a simple matter to bring it down to the actual condition of affairs. With reference to Mr. Dibdin's remarks, although he (Mr. Methven) had referred to certain candle experiments in the paper, he must not conclude that he was an advocate for the continuance of the use of the sperm candle. If everyone, however, used sperm candles in the way he had done—more especially while conducting these experiments—he believed the results would be more regular than they generally were. He might say, with reference to Mr. Dibdin's experiments, that there was a contrast, inasmuch as his (Mr. Methven's) experiments were made and recorded—they were, in fact, daily testings—throughout the whole twelve months, in accordance with the "Instructions" of the Gas Referees, and in compliance with the statutory requirements. As such, they were entitled to some consideration. Mr. Dibdin's experiments were possibly made with a view to finding out their greatest defects. They were not extracts from his daily returns of gas testing; and perhaps this accounted for the difference. He thanked the members for the hearty manner in which they had received his paper.

The President observed that they were greatly indebted to Mr. Methven for bringing the paper before their Association. At the previous meeting, they passed a vote of thanks to him; and on behalf of the members he again thanked him.

Steel Water-Pipes.—Steel pipes as a substitute for cast iron now form, says the *Engineer*, an important item for the engineer's consideration in Transvaal works; inasmuch as during the past year the transport from Kimberley to Johannesburg—a distance of only 300 miles—cost not less than £30 per ton at the time of the drought, and even in good seasons the cost of transport per ton is as much as from £12 to £15. Consequently, any substitute for heavy cast-iron pipes is much to be desired. Steel pipes are being adopted because they are only about one-quarter of the weight of cast-iron pipes of the same internal diameter, and they are less liable to fracture than cast iron. For the water supply of the city of Pretoria, Messrs. James Russell and Sons, of Wednesbury, have obtained the contract for manufacturing some 27 miles of steel pipes. The same firm supplied the pipes, or a portion of them, for the Kimberley Water-Works in Cape Colony, which have done good service. The Consulting Engineers for the Pretoria Water-Works are Messrs. E. Pritchard and Co., who are also the Engineers for the proposed scheme for the supply of water to Johannesburg and neighbouring gold mines, where upwards of 4000 tons of pipes will be required, as well as for the water supply of Klerksdorp, another prosperous town second only to Johannesburg.

THE GAS UNDERTAKINGS RETURNS.

The returns relating to the gas undertakings of the United Kingdom—for the year ending Dec. 31, 1888, in the case of the Companies, and March 25, 1889, in the case of the Local Authorities—which were ordered by the House of Commons to be printed on the 2nd of April last year, were issued last Thursday. As compared with previous occasions, greater delay than ever has taken place in the publication of these important statistics; for whereas those for 1887-8 were ordered on Aug. 9 of the last-named year, and appeared on the 10th of the following January, the papers now under notice were rather more than ten months—or twice as long—in preparation. Now that they have been published, however, we give, as usual, the principal figures; leaving for a future occasion anything like an analysis of them.

The returns furnish particulars in regard to 395 authorized gas undertakings belonging to companies, of which 9 are in Ireland. Local authorities to the number of 173 furnished particulars relating to their gas-works; and of these 139 are situated in England and Wales, 29 in Scotland, and 5 in Ireland. The total amount of capital authorized for these 568 gas undertakings is £75,831,794. A small portion of this, however, has been raised for other purposes; but the total is small, and is scarcely definable. The amount paid up and borrowed is £59,072,367. The total receipts are £15,351,990; the expenditure is £10,477,171. With respect to the statistics of working, we find that the quantity of coal and cannel carbonized in the periods covered by the returns, was 9,255,570 tons; the gas produced therefrom being 94,709,667,240 cubic feet, of which 87,023,288,705 cubic feet were sold. There were 21,123½ miles of mains in use for the supply of 2,192,946 consumers and 434,112 public lamps. The returns are more complete than in former years; but even now there are 10 instances in which the length of gas-mains in use cannot be supplied, and in a few instances the quantity of the gas made by certain local authorities has not been furnished.

Comparing the foregoing figures with similar returns for previous years, it will be seen that the capital obligations of the Companies are as follows:—

Year.	Share and Premium Capital Paid up.	Loan Capital Issued.	Capital Sold under Auction Clauses.	Premiums realized.
1882 . .	£28,589,148	£4,345,787	£2,065,905	£957,561
1883 . .	29,038,726	5,075,804	2,538,709	1,088,675
1884 . .	29,594,464	5,330,550	2,810,415	1,188,750
1885 . .	30,109,429	5,404,141	3,088,460	1,306,238
1886 . .	30,960,026	5,679,830	3,209,564	1,393,773
1887 . .	31,556,788	5,839,792	3,354,093	1,473,656
1888 . .	31,736,024	6,002,510	3,488,588	1,517,902

Some of the other comparative details in the Companies' returns are these—

Year.	Tons of Coal Carbonized.	Cubic Feet of Gas Made.	Number of Consumers.	Public Lamps Lighted.
1882 . .	4,928,695	49,360,289,059	1,055,009	224,300
1883 . .	5,171,963	52,330,749,963	1,091,388	235,338
1884 . .	5,361,576	54,452,255,864	1,102,628	242,782
1885 . .	5,595,371	56,903,060,785	1,115,223	250,404
1886 . .	5,777,966	59,051,111,814	1,133,897	258,072
1887 . .	5,977,254	61,266,055,857	1,152,119	264,316
1888 . .	6,050,588	62,328,542,470	1,103,198	259,921

The somewhat similar figures of the Local Authorities are—

Year.	Amount Borrowed, Including Annuities (not deducting Amount repaid).	Receipts.	Expenditure (exclusive of Amount in next Column).	Interests, &c., Paid.*	Net Profit after Payment of Items in preceding Column.
1882 . .	£17,326,183	£4,098,828	£2,759,304	£845,936	£510,268
1883 . .	17,874,351	4,252,296	2,877,732	873,921	524,010
1884-5 .	18,758,895	4,334,059	3,066,386	894,836	399,714
1885-6 .	19,619,416	4,348,105	3,117,989	901,773	355,469
1886-7 .	19,723,046	4,403,262	3,127,047	951,636	359,532
1887-8 .	20,081,435	4,495,093	3,161,604	923,157	439,467
1888-9 .	21,333,833	4,817,269	3,375,197	977,154	479,489

* These figures include: (1) Interest paid on loans; (2) amounts paid for annuities; (3) amount of loans repaid; (4) amount paid for redemption of annuities; (5) amount placed to sinking fund.

Year.	Tons of Coal Carbonized.	Cubic Feet of Gas Made.	Number of Consumers.	Public Lamps Lighted.
1882 . .	2,352,062	23,223,054,342	916,962	137,011
1883 . .	2,459,341	24,507,217,850	928,458	140,198
1884-5 . .	2,642,942	26,120,491,840	955,728	144,506
1885-6 . .	2,783,533	27,734,666,850	979,802	151,670
1886-7 . .	2,879,765	28,880,425,240	996,480	155,849
1887-8 . .	2,985,577	30,105,457,962	1,011,139	159,264
1888-9 . .	3,204,982	32,381,124,770	1,089,748	174,191

THE VAN STEENBERGH WATER-GAS PROCESS.

In another column will be found an article dealing with the experimental trial of Mr. Van Steenbergh's process for making water gas, which is now going on at Humphrey's Hall, Knightsbridge, under the supervision of Professor Vivian B. Lewes. The following tabular statements, compiled by Professor Lewes, contain some figures which will be of considerable interest taken in connection with the remarks appearing elsewhere:—

TABLE I.—*Giving Full Details of the Make of Carburetted Water Gas by Van Steenbergh's Plant (Feb. 11, 1890).*

Quantity of gas made	8400 cubic feet
Time occupied—	
In blowing	58 minutes
In gas making	48 „
Fuel consumed—	
Anthracite	205 lbs.
Naphtha (70° Beaumé)	23 galls. 6 pts.
Illuminating power of gas made (corrected)	20·5 candles.

Analysis of Gas.

	Unpurified. Per Cent.	Purified. Per Cent.
Hydrogen	—	40·33
Marsh gas	—	17·08
Illuminants	—	7·59
Carbonic oxide	—	25·00
Carbonic acid	2·15	0·50
Oxygen	—	0·17
Nitrogen	—	9·33
Sulphuretted hydrogen	2·84	nil
		100·00

Total sulphur (by Letheby test)	6·67 grains per 100 c. ft.
Sulphuretted hydrogen in unpurified gas	23·80 „ „
Sulphuretted hydrogen in purified gas	nil
Ammonia	nil
Bisulphide of carbon	nil

Consumption of Materials per 1000 Cubic Feet of Gas Made.

Naphtha	2 galls. 6½ pts.
Anthracite	24½ lbs.

TABLE II.—*Showing the Composition and Illuminating Power of the Gas made by the Van Steenbergh Plant from Various Carbonaceous Fuels with 76° Naphtha.*

	Foundry Coke.	Gas Coke. Unpurif'd.	Gas Coke. Purif'd.	Anthracite. Unpurif'd.	Anthracite. Purif'd.
Hydrogen	33·44	—	39·05	—	38·44
Marsh gas	23·38	—	26·71	—	19·30
Illuminants	11·14	—	9·27	—	7·49
Carbon monoxide	19·00	—	13·50	—	23·81
Carbon dioxide	2·24	6·01	1·02	2·16	0·42
Nitrogen	9·50	—	9·72	—	9·69
Oxygen	1·30	—	0·73	—	0·85
Sulphuretted hydrogen	nil	0·35	nil	trace	nil
Illuminating power (corrected)	22·4 Candles.	—	22·9 Candles.	—	21·8 Candles.

Note.—The low carbonic oxide in the make from gas coke is due to the fuel never being so hot as with anthracite; and the result is an increase in the percentage of carbonic acid in the unpurified gas.

Manchester District Institution of Gas Engineers. — The twentieth annual meeting of this Institution will be held in the Memorial Hall, Albert Square, Manchester, on Saturday next. According to the *agenda* issued by the Honorary Secretary (Mr. Mellor, of Northwich), the opening business will consist of the reception of the report and accounts, the election of officers, and the admission of Mr. E. A. Loam, of Stalybridge, as a member. These matters having been disposed of, the new President (Mr. Walter W. Hutchinson, of Barnsley) will deliver his Inaugural Address. After this the discussion on Mr. Isaac Carr's paper on "The Dinsmore Process," read at the preceding meeting (see JOURNAL, Vol. LIV., pp. 1060, 1105), will be re-opened by the author, who will give a few additional particulars on the subject of his communication. Mr. T. Newbigging's paper on "The Utility of Water in Gas Manufacture," presented at the November meeting, and given in the JOURNAL for Dec. 3, will then be considered; and at the close of the business the members will take tea together at the Star Hotel, Deansgate.

The Lever Case.—The 14th of next month has been fixed for the trial, at the Leeds Assizes, of the action initiated by the Salford Corporation against Mr. Ellis Lever. Mr. Lever, as already stated, has retained the Attorney-General (Sir R. E. Webster, Q.C., M.P.) to appear on his behalf. The truth about the withdrawal of Sir Charles Russell from the case has not, says a local paper, been stated; the fact being that he accepted the brief of the Corporation (as by the terms of his retainer he was obliged to do), but was afterwards relieved of the duty in consequence of his previous connection with the case as Counsel for Mr. Lever. Under these circumstances, the services of the Solicitor-General have been secured as leading Counsel for the Corporation. On behalf of the Corporation, application will at once be made in the Queen's Bench Division for an order calling upon Mr. Lever to amend his answers to the interrogatories, failing which that they shall be struck out. It is rumoured, says a Salford newspaper, that disclosures will be forthcoming from an unexpected quarter, before which the facts in the case of the *Salford Corporation v. Lever* will "pale into insignificance."

REGISTER OF PATENTS.

Gas-Washer.—Irving, D., and Cockey, A., of Bristol. No. 4869; March 20, 1889. [8d.]

The construction of this gas-washer is shown in the illustration—fig. 1 being a part side elevation of the lower portion of the washer; and fig. 2 part of an elevation at right angles to fig. 1. Fig. 3 shows, in quarter section (and drawn to a larger scale), the top of the washer—the distributing apparatus being omitted to avoid confusion—with the gas ways and baffling plates belonging to this section. Fig. 4 is a vertical sectional elevation of the top and bottom compartments of the washer (the liquid distributing apparatus being also in this case omitted), showing the way the plates are raised or lowered, and the overflow-pipes cast in the side of the gas-way pipes. Fig. 5 is a section of one of the overflow-boxes; and fig. 6 is a sectional plan of same.

Fig 1.

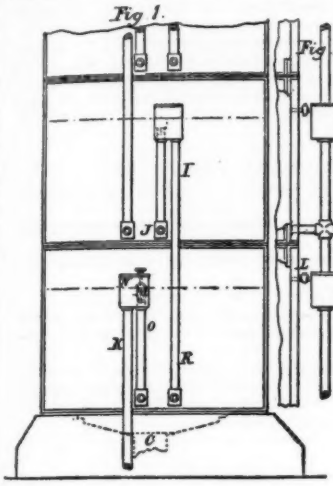


Fig 2.

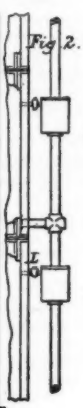


Fig. 3.

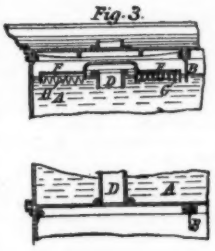


Fig. 4.

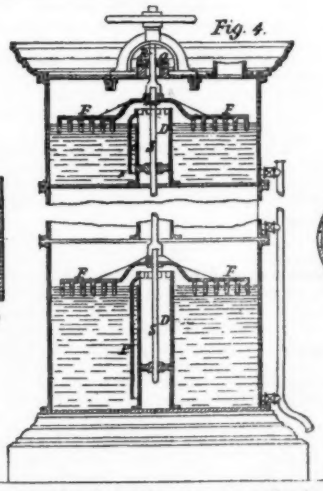


Fig. 5.

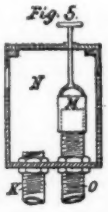


Fig. 6.

The apparatus is made of circular or rectangular form, of cast iron divided horizontally into a number (not less than five) of compartments A, placed one above the other. These compartments are again divided into four, vertically by partitions B, so that the gas from the inlet C below enters in four streams through the gas-way D; and these streams are again subdivided by means of curtains fixed to the plate F, to which the perforated projections G or baffling teeth H are attached. The water enters at the top, and is made to spray by impinging upon a bell, or else is distributed by any of the well-known arrangements. It passes through the top chamber by an overflow pipe—in the first case by a pipe or channel P (fig. 4) cast in the side of the gas-way pipe; the inlet of this overflow-pipe being near the bottom of the compartment, so that any tar which may collect is removed at the same time as the liquid flows down the gas-way pipe D, and in this way additional wetted surface is presented to the ascending gas. In the second case (as shown in fig. 1) the liquid overflow I is fixed on the outside; and the inlet J to the overflow in this case is also placed at the bottom of the compartment, in order to remove any tar which might otherwise accumulate.

This overflow arrangement—illustrated in fig. 1—is applied in like manner to the compartments above. It also serves to adjust the level of the water, and consequently the depth of the seal and the back pressure given by each chamber, so as to suit the varying production of gas. The outlet K of the overflow enters the bottom of the chamber below; so that when the side cock L is shut, and the cover removed, the pipes may be cleaned. Without in any way shutting off the gas, but by raising or depressing an adjustable socket M within a box N, into which the top of both the water inlet and outlet pipes K and O enter, the level of the liquid in the chamber may be adjusted.

In a further arrangement, the water is maintained at a constant level; the dip or seal being regulated by raising or lowering through a stuffing-box Q (fig. 4), by means of a screw R fixed at the top or bottom of the apparatus, the shaft S, to which the trays in each chamber are fixed. The screw is worked by a spur-wheel or worm, or any other suitable arrangement geared to the side of the apparatus.

Ammoniacal liquor can be obtained, the patentees mention, from the bottom chamber of any desired strength, within certain limits, by regulating the supply of clean water entering the top chamber. The gas, as already explained, enters the apparatus at the bottom of the washer, and is brought into contact in the lowest chambers with the strong ammoniacal liquor, while in each succeeding chamber the liquor is weaker, until the gas reaches the top one when it will meet with pure water only. Draw-off cocks are fixed at the bottom for the purpose of emptying each chamber, or one chamber may be run into the other. The sealed receiving trough, which is also part of the washer, is for the purpose of obtaining samples, and also for observing that the apparatus is working properly. Not only are the pipes leading into this trough sealed, but the cover also, so as to prevent loss of ammonia.

Stop Gas-Meters.—Glover, S. and T., of St. Helens. No. 5754; April 4, 1889. [8d.]

This invention relates to apparatus for cutting off the supply of gas as soon as a predetermined quantity has been consumed, consisting of an additional wheel gearing with one of the wheels of the counting mechanism, a clutch or equivalent device, a second wheel connected to the first wheel through the clutch, means for rotating the second wheel and setting the apparatus, an indicating dial and finger, an arm or wheel on the shaft of the first and second wheels, and an arm on the valve spindle—all as illustrated in the accompanying engravings.

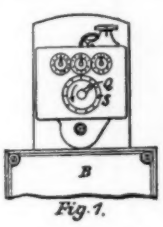


Fig. 1.

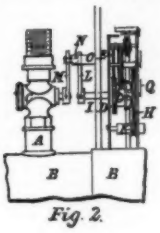


Fig. 2.

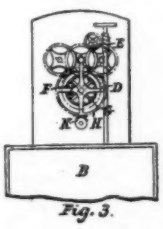


Fig. 3.

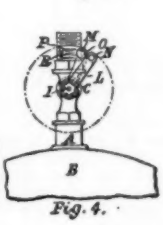


Fig. 4.

Fig. 1 is a front elevation of the meter; fig. 2, a side elevation; fig. 3, an elevation of the wheel-work; and fig. 4, an elevation of the arrangement preferred for operating the valve.

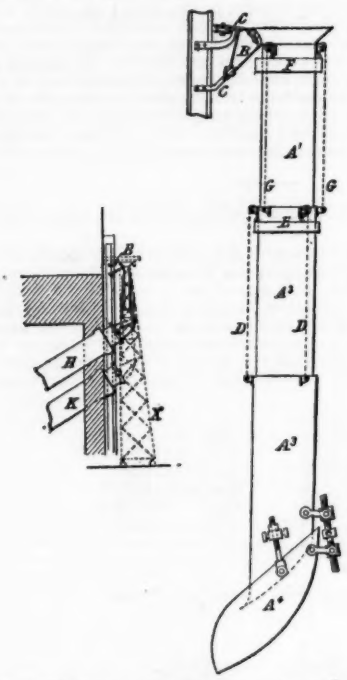
A is the outlet of the meter B; C, the valve; D, the wheel gearing with (preferably) the hundreds wheel E; F, a friction disc or clutch secured to the wheel D, and which may have its face serrated as shown in fig. 3; and G, a set of arms concentric with the wheel D, and tending by their natural springiness to engage with the part F. These arms are secured to the wheel H or to the shaft I, on which both the wheel H and the wheel D are mounted. K is a pinion gearing with the wheel H; and L is an arm fixed on the back end of the shaft I. M is an arm secured on the valve spindle, and provided with the curved slot P; O, a stud fixed to the framing and entering the slot P; N, a pin or stud on the arm L, so fixed as to come into contact at the proper time with the arm M; and Q, an index finger mounted on the front end of the spindle I, and moving over the graduated dial S. The dial is graduated (when the gearing is as described) to indicate hundreds of feet; and the index is represented in fig. 1 as in the zero position.

To set the apparatus for the supply of a given quantity of gas, the pinion K is rotated by a suitable key until the figure indicates 10, when by the rotation of the arm L, the stop thereon will have come into contact (at R, fig. 4) with the valve arm M, and by its continued movement have opened the valve; and if it be required to supply 1000 cubic feet, the finger is left at the 10. If, however, a smaller quantity—such as 500 feet—is paid for, the finger is moved backwards, by means of the key, until the finger is over the 5 or other figure indicating the number of hundreds of feet paid for by the consumer. The passage of the gas through the meter operates the counting wheels in the usual manner; and their motion is communicated through the wheels E and D to the shaft I, the rotation of which closes the valve by means of the arms L M when the finger Q has returned to zero. The spindle of the wheel has a socket of any peculiar shape in its front end, so as to secure that the wheel can be rotated only by a particular key; and, as an additional precaution, the opening to the socket, after the apparatus has been set, can be closed by means of a seal.

Charging Inclined Gas-Retorts.—Morris, F., of Brentford, and Van Vestrant, L., of Southall. No. 16,489; Oct. 18, 1889. [6d.]

In setting inclined gas-retorts, the inventors remark, they present their upper mouths at different heights, and in different vertical rows; and the present invention relates to means for charging retorts so set by the use of a shoot, which can be adjusted in length and in position in order to conduct the coal from a supply above to the mouth of any one of the group of retorts. For this purpose, at a convenient height above the highest tier of retort mouths, there is provided a frame or carriage that can be moved on rollers horizontally along rails; and from this carriage there is suspended a tubular shoot made in several sections fitted to slide freely along one another like the tubes of a telescope, and balanced by weights attached to chains passing over

pulleys mounted on the next higher section. When it is desired to charge any one of the retorts, its mouth is opened, the carriage is run along the rails until the shoot comes vertically over the retort mouth, and its sections are slid telescopically until the lowest one reaches the mouth, whereupon coals can be delivered into the upper end of the shoot so as to descend into the retort.

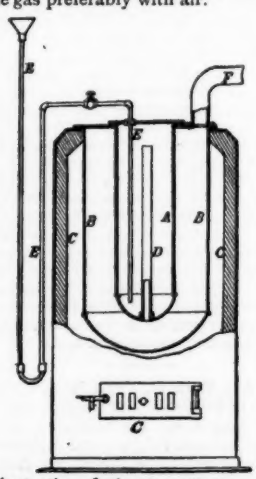


The illustrations show portions of two inclined retorts to the charging of which a shoot, according to this invention, is applied; also an elevation of the shoot to an enlarged scale.

The shoot, as already mentioned, consists of a tube made in three lengths or sections A^1, A^2, A^3, of which A^2 can slide freely along A^1, and A^3 along A^2. The highest length (A^1) is carried by a carriage B having rollers which run along rails C. The lowest length (A^3) is connected to a counterweight E by chains D passing over pulleys mounted at the upper end of the length A^2; and the length A^2 is similarly connected to a counterweight F by chains G passing over pulleys mounted at the upper end of A^1, or on the carriage B. To the lowest section (A^3) is hinged a curved shoot A^4, which can be adjusted so as to direct the coals as desired into the mouth of any retort. The shoot is shown in position for charging the uppermost (H) of a row of inclined retorts; the dotted lines A^5 indicating the shoot extended to charge a lower retort K. The retorts being arranged in several vertical rows, the shoot can be moved by running the carriage B along the rails, so as to come immediately above a retort in any vertical row; and it can be extended telescopically to reach the mouth of the retort.

Manufacture of Oil Gas.—Knapp, D. H., of Norwich, N.Y., U.S.A. No. 16,646; Oct. 22, 1889. [6d.]

This invention relates to the manufacture of gas, for illuminating and heating purposes, from oils or liquid hydrocarbons, with capability of diluting the gas preferably with air.



A and B in the illustration designate retorts, one within the other; the inner one being the vaporizing, the outer one the decomposing retort. The decomposing retort B has an external flange at its upper end, by which it is supported on the top of the furnace C. It is also provided with a moveable cover secured to its flange, in which is an opening through which the inner retort A is inserted; the latter being provided at its upper end with an external flange resting upon the cover and also having a moveable cover. In the lower end of the vaporizing retort is an opening in which is secured an upright pipe D, extending upward into the retort nearly to the top, and open at its upper end; the pipe forming a communication between the upper part of the vaporizing retort and the lower part of the decomposing retort. E is a pipe for supplying oil to the retort A; this pipe entering the retort through the cover, and projecting downward into the retort nearly to the bottom. F is a pipe connected with the decomposing retort B, at the top, and forming an outlet for the gas, which may pass directly to a gasholder, or to purifying apparatus, whence a pipe leads to the holder.

In operation, the oil introduced through the pipe E enters the vaporizing retort A, which, being surrounded by the decomposing retort B, is protected from the great heat of the furnace, but has heat enough imparted to it through the decomposing retort for the vaporization of the oil which enters it at the bottom. The oil-vapour rising to the top of the retort A finds its exit through the pipe D, to the lower part of retort B, wherein it is decomposed by the great heat to which that retort is subjected. The vapours enter the decomposing retort at the bottom, circulate within the annular space between the two retorts, and pass along the entire heated surface of the decomposing retorts before reaching the outlet E; and therefore perfect decomposition of the vapour is said to result, and it is converted into permanent gas to be diluted for use (as with air) as required for illuminating or heating purposes.

APPLICATIONS FOR LETTERS PATENT.

2115.—Attewell, T., and Mason, G., "The Patent fixed star gas economizer." Feb. 10.

2155.—Aubert, W., Jun., "Improvements in automatic carburetting gas-fittings." Feb. 10.

2166.—Diemel, F., "Improvements connected with gas-burners." Feb. 11.

2198.—Lavender, G. L., "Improvements in burners." Feb. 11.

2207.—Scollay, W., "Improved construction or arrangement of apparatus with means for regulating the admission of air and of gas to Bunsen burners." Feb. 11.

2242.—Hlawaty, F., "Improvements in the process of preparing benzol and its homologues naphthaline and anthracene from petroleum, petroleum scales, tar, tar oils, paraffin, vaseline ozokerit, and the like, and from natural illuminating gas." Feb. 11.

2256.—Robbins, J., "Improvements in water and other pipes." Feb. 12.

2283.—Hughes, W., and Gipprich, E., "Improvements in or appertaining to apparatus for the manufacture of oil gas." Feb. 12.

2339.—Thorp, T., and Marsh, T. G., "An improved gas-regulator.' Feb. 13.

2341.—Scudder, F., and Colman, H. G., "Improvements in the manufacture or treatment of gases containing carbonic oxide, such as water gas and producer gas to render them odorous." Feb. 13.

2343.—Wrigley, T., "Improvements in mechanical stokers." Feb. 13.

2429.—Hiller, H. K., "Improvements in or relating to apparatus for regulating the pressure or flow of gas or other fluid." Feb. 14.

2459.—Petit, L., "Improvements relating to regulating or controlling and indicating apparatus, chiefly designed for use in connection with gas-supply pipes." Feb. 14.

Belfast Gas Workmen and Eight-Hour Shifts.—The stokers and firemen in the employ of the Belfast Corporation Gas Committee held a meeting last Tuesday, at which they passed a resolution reminding the Committee of their promise to adopt eight-hour shifts at the beginning of the year, and humbly urging them to have this satisfactory settlement of their grievances put into force with all possible speed. A deputation was appointed to wait on the Engineer (Mr. J. Stelfox) in reference to the matter. The men also resolved to form themselves into a Union.

The Falmouth Gas Company's Bill.—The Joint Committee of the Falmouth Town Council and the Parish Local Board have reported that a conference has been held with the Directors of the Company in reference to their Bill; and it resulted in certain concessions being made. One most important agreement was that the Company were willing to give the ratepayers of the town and parish a reasonable opportunity of buying the gas-works, and were prepared to insert a clause binding themselves within three years to sell by agreement, or, failing agreement, by arbitration.

York and the Bradford Water Scheme.—Yesterday week a Special Committee of the York Corporation appointed to make arrangements to oppose, if necessary, the Bill of the Bradford Town Council, held a meeting, which lasted nearly four hours. A deputation, representing the latter authority, waited upon the Committee, and conferred with them on the points at issue between the two bodies. After a protracted interview, the deputation withdrew, and were subsequently informed that the objections on which the York Corporation rested their opposition to the Bradford scheme should be drawn up in detail, and forwarded to the Bradford Corporation.

The Public Lighting Question at Bridlington Quay.—A fortnight ago we reported the extraordinary position in which the Bridlington Local Board had placed themselves in regard to the public lighting, by the rejection of both the Gas Company's tender and that of Messrs. Lane, Wharton, and Down for the supply of electricity; and in consequence of which, unless some arrangement is previously arrived at, the town will be in darkness on the 26th prox. The ratepayers are taking up the matter, and have held a public meeting on the subject, at which Dr. Redman, the Chairman of the Lighting Committee of the Board, was the principal speaker. He strongly advocated the adoption of the electric light; and declared that, in his judgment, the firm of electricians who had tendered could efficiently light the district for £900 a year. A resolution was passed, in which the opinion of the meeting was stated to be that the immediate adoption of electricity for public lighting would be a very great improvement and of great advantage to the ratepayers at large.

CORRESPONDENCE.

[We are not responsible for the opinions expressed by correspondents.]

The Gas Institutes—Old and New.

SIR,—I learn from your issue of the 18th inst., that a meeting of the Provisional Committee for the new Institution of Gas Engineers is called for the 1st prox.

Before any new Institute is formed, would it not be well to take into consideration the marked feeling in favour of a re-union shown at the last meeting of The Gas Institute? The desire to improve the character of such an institution is not confined to one side. Why, therefore, should there not be—even at the eleventh hour—an honest endeavour made on both sides to discuss the situation, to minimize differences, and if possible to agree upon a scheme that would commend itself to nine-tenths, if not to all, reasonable-minded men in the profession?

As an old member of the Institute, having some knowledge of the views both of those who remain and those who have left the Institute, I venture to say that a new Institution does not appear to most of them the only, nor the wisest outcome of recent discussions on this subject. Why, therefore, insist upon it?

The Gas Institute appears to have done something in the interval to avert its necessity. I would suggest, therefore, that The Gas Institute and the promoters of the new movement should each delegate a certain number of members in order to discuss and, if possible, agree upon proposals for establishing, once for all, a thoroughly representative Institute—an Institute not for one section but for all sections of the profession.

X. Y. Z.

Feb. 22, 1890.

Photometry.

SIR,—In your last week's notice of the Southern District Association meeting (p. 281), are two statements to which I hope I may be allowed to refer. The first is that, with an invariable standard, the different forms of photometer now in use in the Metropolitan testing-places would assign to the same sample of gas values differing by a candle or two. It must be admitted that some of the box photometers in the older testing-places had suffered by their black velvet linings and blackened metal roofs having become less absorbent of light. I have in several cases estimated the error from this cause by screening off from the disc the direct rays of the burner and measuring the reflected light, which has been nearly balanced by the light from one candle at the opposite end of the box. Since the candle light also receives some increase by reflection, it is improbable that the error of the box photometer from this source ever amounted to one candle. Screens are a better hindrance to reflected light than blackened surfaces—first, because a good deal of slant light is reflected from a black surface, while the opacity of a metal or wooden screen is absolute; and, secondly, because a black surface may become, in course of time, more shiny or less black, whereas a screen will not become less opaque. All the official photometers are now provided with screens on both sides of the disc; and I see no reason for doubting that if the gas-burner and the constant standard were duly fixed at the two ends of the scale, and the pointer beneath the centre of the disc, all these photometers would assign the same value, within a few tenths of a candle, to the same sample of gas. Apart from their effect on the behaviour of candles, the differences between these photometers are immaterial, except perhaps the removal of the scale from its proper position between the uprights which support the two sources of light. This peculiarity of the box-photometer, which increases the risk of error by displacement of the pointer, has also been done away with in many cases.

But although the existing differences may easily be exaggerated, it is undoubtedly desirable that some one form of photometer should be set up in all the testing-places. This, however, involves a decision as to what form should be adopted; and, since the best photometer for use with a couple of candles would probably not be that best suited to another standard, such a decision cannot well be arrived at in the present uncertainty as to what comparison light will be used in the future. To refit the testing-places with new photometers designed to keep as constant as possible the brightness and position of candle-flames, when all are agreed that candle-testing is at its best untrustworthy and must be done away with, would be to inflict a useless expenditure upon the Gas Companies.

A comparison of the various official photometers, supplied with the same gas and an invariable standard, is unfortunately impracticable; but the second statement which I venture to question, is so definite, so easily put to the proof, and at the same time so absolutely condemnatory of the photometers to which it relates, that I am tempted to ask whether you are willing to inquire further into the matter. The statement is as follows:—"So far from the photometer difficulty being wholly, or even mainly, a question of the standard, we know of cases where the necessary 3-inch flame cannot by any means be obtained from the gas in the regulation photometer, while the very same gas will give a flame an inch longer in an identically similar burner placed in a different instrument in the same room."

Last year the Gas Referees heard of one case where a difference in the height of the flames was alleged. I went to the testing-place and examined the two photometers, which were in neighbouring rooms. One was a tower-photometer, the other a box-photometer. In the latter the flame of the Argand was excessively unsteady; but, as far as I could observe, there was no difference—certainly there was no considerable difference—between the average height of the two flames when the consumption was in both cases 5 cubic feet an hour. Possibly the report which has reached you is an extended version of this case. But if not, I hope you may be willing to state at what testing-places these comparisons have been made. The fact having been established, the cause will demand the most careful investigation. Two standard Argands with similar chimneys, whose flames are 2¾ and 3¾ inches respectively, can hardly differ in their light by less than 2 candles; and whether the unofficial or the official photometer is in fault, complaints will be made or injustice done. As I have worked for twenty years with the "London" Argand, and have never witnessed any such effect upon it of the form of photometer as you describe, I still cling to the hope that the report you have heard is not fully worthy of your belief.

A. VERNON HARCOURT.

Feb. 22, 1890.

A Question as to the Action of Water Meters.

SIR,—In reply to "Water Meter" (p. 245 of the JOURNAL), in the first place I am anxious to know what corporation allows a supply to be fixed direct to feed a boiler. I am certainly not acquainted with any water company's regulations admitting such a dangerous practice. The regulations made under the Metropolis Water Act, 1871, provide "that there shall be no direct communication from the pipes of the company to any boiler, urinal, or water closet." It is one of the stock arguments of agitators, when advocating the confiscation of a water company's property, that it can be managed more economically, that they would have the power to compel all fittings to be put in order, and by the use of meters no complaints would ever arise. But this particular corporation have not succeeded in satisfying even a trade customer. If all the domestic supply was doled out by meter, no doubt the town clerk would be well employed, and not the least among his clients would be "Water Meter."

It appears that the meter was read half yearly. "Water Meter" never seems to have taken any interest in the apparatus whatever. It being a new thing, the men were moderately careful about waste; and the first account was paid. Seeing the bill was small, no more notice was taken of it for six months; and incessant use and waste soon told its tale. When the next bill came in, of course, the men in the factory were threatened with dismissal; and this had the effect of causing a little more care to be taken, which naturally reduced the amount of the next account. But when the new meter was put in, and the lawyers had a case, great vigilance was exercised; and only the quantity of water necessary for the work was used.

Now because four months showed 60,000 gallons were used, that is no argument, or even a fact useful as an average in this case, to fix the sum of 90,000 for six months.

"Water Meter" should read his own meter every day, or periodically for some months, unknown to his employees, and he would then know if he were paying a fair rate or not. It is very easy to object to pay the account; but the vendee has duties to perform as well as the meter inspector, who is evidently an overworked corporation official, as he reads meters only twice in the year, instead of twelve times.

Further on, "Water Meter" says: "The supply pipe has been tested closed; also full open, running at full pressure. But we are not informed how long the pipe is? if buried underground, or in sight? the number of angular bends, &c., &c.? Will "Water Meter" state the length of pipe, the pressure when the pipe was closed, and how long the gauge stood to that pressure, the exact size of the 1000-gallon measuring tank, whether the pressure was taken as that carried in the mains, or from a gauge fixed (say) one foot from the tank, readings being taken whilst the experiment was being made, and whether the experiment agrees with any text-book? or is he 90 per cent. in error? "Water Meter" will, I fancy, be surprised at the result of his experiment when tried as it should be and compared with others. I have had numbers of such complaints, and find that incredulous customers cannot be satisfied even when they stand by the experimental tank and witness the measurement, because the result does not agree with their own rough experiment.

"Water Meter" says that the reading "of meters is of considerable importance to the public." Yet, I find few who care to give the matter two minutes' thought. There can be no difficulty for a schoolboy to decipher the index of any water-meter. It is simply numeration; and the public are not slow to understand any indicator when it touches their pocket.

I shall be anxious to read the opinions of experts on this subject. I have had an extensive experience with all meters, and have been compelled to listen to such tales as: "Could not have used the water; the pipe could not deliver it," &c. But for a meter to always play fast and loose as this one does—always in favour of the Corporation too—and, when found out, to adjust itself again, is too good even for

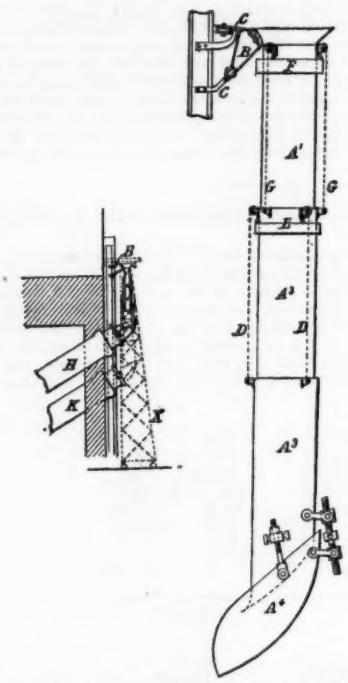
A COMPANY'S METER INSPECTOR.

Feb. 21, 1890.

The Quality of the Portsmouth Gas.—According to the last report presented to the Finance and Parliamentary Committee of the Portsmouth Corporation by their Gas Inspector (Mr. H. Moncreaff), the quality of the gas supplied in the borough by the Portsea Island Gas Company in the last quarter of the year 1889 was very satisfactory. During this period Mr. Moncreaff made 107 testings of the illuminating power, and 45 of the purity of the gas; and on all occasions the statutory requirements were fulfilled. The average illuminating power was 15·06 candles, or 1·06 candles above the standard; and the average quantity of sulphur impurity in the gas was 8·93 grains per 100 cubic feet—being 23·07 grains below the limit. The latter results testify to the care exercised by the Company's Engineer and Secretary (Mr. S. B. Darwin) in the purification of his gas.

Mossley Corporation Gas Supply.—In moving the adoption of the Gas and Lighting Committee's minutes at the last meeting of the Mossley Town Council, the Mayor (Alderman R. S. Buckley) said he was glad to announce that the make of gas had much improved, compared with what it was under the eight-hour system; and it seemed better than it was under the previous twelve-hour system, with the old stokers. This being the case, he did not think they had had much reason to regret their action in going back to the twelve hours. Of course, he had no objection to the eight-hour instead of the twelve-hour shift, if one plan could be worked as well as the other. He also stated that the Committee would have to spend some money in re-setting a number of the retorts; and they were considering whether it would not be advisable to adopt four sets of regenerative furnaces. By passing the minutes, the Council would sanction this; but they might assured that the Committee would not spend the money without they obtained full value for it. The minutes were confirmed.

pulleys mounted on the next higher section. When it is desired to charge any one of the retorts, its mouth is opened, the carriage is run along the rails until the shoot comes vertically over the retort mouth, and its sections are slid telescopically until the lowest one reaches the mouth, whereupon coals can be delivered into the upper end of the shoot so as to descend into the retort.

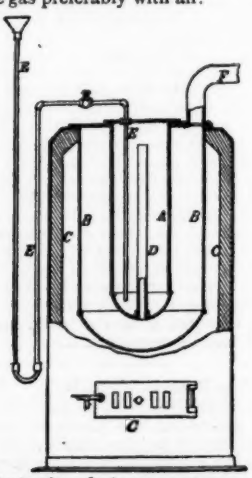


The illustrations show portions of two inclined retorts to the charging of which a shoot, according to this invention, is applied; also an elevation of the shoot to an enlarged scale.

The shoot, as already mentioned, consists of a tube made in three lengths or sections A^1, A^2, A3, of which A^2 can slide freely along A^1, and A3 along A^2. The highest length (A^1) is carried by a carriage B having rollers which run along rails C. The lowest length (A3) is connected to a counterweight E by chains D passing over pulleys mounted at the upper end of the length A^2; and the length A^2 is similarly connected to a counterweight F by chains G passing over pulleys mounted at the upper end of A^1, or on the carriage B. To the lowest section (A3) is hinged a curved shoot A4, which can be adjusted so as to direct the coals as desired into the mouth of any retort. The shoot is shown in position for charging the uppermost (H) of a row of inclined retorts; the dotted lines A5 indicating the shoot extended to charge a lower retort K. The retorts being arranged in several vertical rows, the shoot can be moved by running the carriage B along the rails, so as to come immediately above a retort in any vertical row; and it can be extended telescopically to reach the mouth of the retort.

Manufacture of Oil Gas.—Knapp, D. H., of Norwich, N.Y., U.S.A. No. 16,646; Oct. 22, 1889. [6d.]

This invention relates to the manufacture of gas, for illuminating and heating purposes, from oils or liquid hydrocarbons, with capability of diluting the gas preferably with air.



A and B in the illustration designate retorts, one within the other; the inner one being the vaporizing, the outer one the decomposing retort. The decomposing retort B has an external flange at its upper end, by which it is supported on the top of the furnace C. It is also provided with a moveable cover secured to its flange, in which is an opening through which the inner retort A is inserted; the latter being provided at its upper end with an external flange resting upon the cover and also having a moveable cover. In the lower end of the vaporizing retort is an opening in which is secured an upright pipe D, extending upward into the retort nearly to the top, and open at its upper end; the pipe forming a communication between the upper part of the vaporizing retort and the lower part of the decomposing retort. E is a pipe for supplying oil to the retort A; this pipe entering the retort through the cover, and projecting downward into the retort nearly to the bottom. F is a pipe connected with the decomposing retort B, at the top, and forming an outlet for the gas, which may pass directly to a gasholder, or to purifying apparatus, whence a pipe leads to the holder.

In operation, the oil introduced through the pipe E enters the vaporizing retort A, which, being surrounded by the decomposing retort B, is protected from the great heat of the furnace, but has heat enough imparted to it through the decomposing retort for the vaporization of the oil which enters it at the bottom. The oil-vapour rising to the top of the retort A finds its exit through the pipe D, to the lower part of retort B, wherein it is decomposed by the great heat to which that retort is subjected. The vapours enter the decomposing retort at the bottom, circulate within the annular space between the two retorts, and pass along the entire heated surface of the decomposing retorts before reaching the outlet E; and therefore perfect decomposition of the vapour is said to result, and it is converted into permanent gas to be diluted for use (as with air) as required for illuminating or heating purposes.

APPLICATIONS FOR LETTERS PATENT.

2115.—Attewell, T., and Mason, G., "The Patent fixed star gas economizer." Feb. 10.

2155.—Aubert, W., Jun., "Improvements in automatic carburetting gas-fittings." Feb. 10.

2166.—Diemel, F., "Improvements connected with gas-burners." Feb. 11.

2198.—Lavender, G. L., "Improvements in burners." Feb. 11.

2207.—Scollay, W., "Improved construction or arrangement of apparatus with means for regulating the admission of air and of gas to Bunsen burners." Feb. 11.

2242.—Hlawaty, F., "Improvements in the process of preparing benzol and its homologues naphthaline and anthracene from petroleum, petroleum scales, tar, tar oils, paraffin, vaseline ozokerit, and the like, and from natural illuminating gas." Feb. 11.

2256.—Robbins, J., "Improvements in water and other pipes." Feb. 12.

2283.—Hughes, W., and Gipprich, E., "Improvements in or appertaining to apparatus for the manufacture of oil gas." Feb. 12.

2339.—Thorp, T., and Marsh, T. G., "An improved gas-regulator.' Feb. 13.

2341.—Scudder, F., and Colman, H. G., "Improvements in the manufacture or treatment of gases containing carbonic oxide, such as water gas and producer gas to render them odorous." Feb. 13.

2343.—Wrigley, T., "Improvements in mechanical stokers." Feb. 13.

2429.—Hiller, H. K., "Improvements in or relating to apparatus for regulating the pressure or flow of gas or other fluid." Feb. 14.

2459.—Petit, L., "Improvements relating to regulating or controlling and indicating apparatus, chiefly designed for use in connection with gas-supply pipes." Feb. 14.

Belfast Gas Workmen and Eight-Hour Shifts.—The stokers and firemen in the employ of the Belfast Corporation Gas Committee held a meeting last Tuesday, at which they passed a resolution reminding the Committee of their promise to adopt eight-hour shifts at the beginning of the year, and humbly urging them to have this satisfactory settlement of their grievances put into force with all possible speed. A deputation was appointed to wait on the Engineer (Mr. J. Stelfox) in reference to the matter. The men also resolved to form themselves into a Union.

The Falmouth Gas Company's Bill.—The Joint Committee of the Falmouth Town Council and the Parish Local Board have reported that a conference has been held with the Directors of the Company in reference to their Bill; and it resulted in certain concessions being made. One most important agreement was that the Company were willing to give the ratepayers of the town and parish a reasonable opportunity of buying the gas-works, and were prepared to insert a clause binding themselves within three years to sell by agreement, or, failing agreement, by arbitration.

York and the Bradford Water Scheme.—Yesterday week a Special Committee of the York Corporation appointed to make arrangements to oppose, if necessary, the Bill of the Bradford Town Council, held a meeting, which lasted nearly four hours. A deputation, representing the latter authority, waited upon the Committee, and conferred with them on the points at issue between the two bodies. After a protracted interview, the deputation withdrew, and were subsequently informed that the objections on which the York Corporation rested their opposition to the Bradford scheme should be drawn up in detail, and forwarded to the Bradford Corporation.

The Public Lighting Question at Bridlington Quay.—A fortnight ago we reported the extraordinary position in which the Bridlington Local Board had placed themselves in regard to the public lighting, by the rejection of both the Gas Company's tender and that of Messrs. Lane, Wharton, and Down for the supply of electricity; and in consequence of which, unless some arrangement is previously arrived at, the town will be in darkness on the 26th prox. The ratepayers are taking up the matter, and have held a public meeting on the subject, at which Dr. Redman, the Chairman of the Lighting Committee of the Board, was the principal speaker. He strongly advocated the adoption of the electric light; and declared that, in his judgment, the firm of electricians who had tendered could efficiently light the district for £900 a year. A resolution was passed, in which the opinion of the meeting was stated to be that the immediate adoption of electricity for public lighting would be a very great improvement and of great advantage to the ratepayers at large.

CORRESPONDENCE.

[We are not responsible for the opinions expressed by correspondents.]

The Gas Institutes—Old and New.

SIR,—I learn from your issue of the 18th inst., that a meeting of the Provisional Committee for the new Institution of Gas Engineers is called for the 1st prox.

Before any new Institute is formed, would it not be well to take into consideration the marked feeling in favour of a re-union shown at the last meeting of The Gas Institute? The desire to improve the character of such an institution is not confined to one side. Why, therefore, should there not be—even at the eleventh hour—an honest endeavour made on both sides to discuss the situation, to minimize differences, and if possible to agree upon a scheme that would commend itself to nine-tenths, if not to all, reasonable-minded men in the profession?

As an old member of the Institute, having some knowledge of the views both of those who remain and those who have left the Institute, I venture to say that a new Institution does not appear to most of them the only, nor the wisest outcome of recent discussions on this subject. Why, therefore, insist upon it?

The Gas Institute appears to have done something in the interval to avert its necessity. I would suggest, therefore, that The Gas Institute and the promoters of the new movement should each delegate a certain number of members in order to discuss and, if possible, agree upon proposals for establishing, once for all, a thoroughly representative Institute—an Institute not for one section but for all sections of the profession.

X. Y. Z.

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PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Monday, Feb. 17.

The following Bills were presented, read the first time, and referred to the Examiners:—Mid-Sussex Water Bill; Newcastle and Gateshead Water Bill; South Lincolnshire Fen Water Bill; Ystrad Gas and Water Bill.

The following Bills were presented and read the first time:—Baildon Local Board Bill; Belfast Corporation Bill; Birkenhead Corporation Bill; Bradford Corporation Water Bill; Dewsbury and Heckmondwike Water Bill; Leicester Corporation Water Bill; Morley Corporation Water Bill; Plymouth Corporation Bill; Stockton and Middlesbrough Water Bill.

Tuesday, Feb. 18.

The Falmouth Gas Bill was presented, read the first time, and referred to the Examiners.

The Bury Corporation (Railway) Bill was presented and read the first time.

Friday, Feb. 21.

The Examiners reported compliance with further Standing Orders in the case of the following Bills:—Mid-Sussex Water Bill; Ystrad Gas and Water Bill.

The following Bills were read a second time:—Baildon Local Board Bill; Belfast Corporation Bill; Birkenhead Corporation Bill; Dewsbury and Heckmondwike Water Bill; Leicester Corporation Water Bill; Morley Corporation Water Bill; Plymouth Corporation Bill; Stockton and Middlesbrough Water Bill.

HOUSE OF COMMONS.

Monday, Feb. 17.

The petitions were presented for the following Bills, which were ordered to be brought in:—

Canterbury Gas and Water Bill, by Mr. Akers-Douglas, Mr. Laurie, and Mr. Pomfret.

City of London Electric Lighting Bill, by Sir Guyer Hunter, Mr. Webster, and Mr. Seton-Karr.

Derby Corporation Bill, by Mr. Roe and Sir W. Harcourt.

St. Martin-in-the-Fields and Strand Electric Lighting Bills, by Mr. Bartley and Mr. Beaufoy.

The petition for the Gravesend and Milton Gas Bill was referred to the Select Committee on the Standing Orders.

The following Bills were read the first time, and referred to the Examiners:—Airdrie and Coatbridge Water Bill; Clayton, Allerton, and Thornton Gas Bill; Derby Gas Bill; Hartlepool Gas and Water Bill; Luton Gas Bill; Newark-upon-Trent Water Bill; Partick, Hillhead, and Maryhill Gas and Electricity Bill; Pontypool Gas and Water Bill; Whitehaven Gas Bill.

The following Bills were read the first time, and ordered for second reading:—Aberdeen Electric Lighting Bill; Bilston Commissioners' Water Bill; Glasgow Corporation Bill; Higham and Hundred of Hoo Water Bill; Huddersfield Water Bill; Oxford Corporation Bill; Thames Valley Drainage Bill; Tunbridge Wells Improvement Bill; Wallasey Local Board Bill; Walsall Corporation Bill; Warrington Extension, Water, &c., Bill; Wessenden Reservoir Bill.

Tuesday, Feb. 18.

The following Bills were read the first time, and referred to the Examiners:—Canterbury Gas and Water Bill; City of London Electric Lighting Bill.

The following Bills were read the first time, and ordered for second reading:—Derby Corporation Bill; St. Martin-in-the-Fields and Strand Electric Lighting Bills.

Wednesday, Feb. 19.

A petition was presented against the Partick, Hillhead, and Maryhill Gas and Electricity Bill, from the Dalmuir, Kilpatrick, and Bowling Gas Company.

Thursday, Feb. 20.

MR. ELLIS LEVER'S VISIT TO THE CONVICT HUNTER.

Mr. HOWORTH asked the Secretary of State for the Home Department whether Mr. Ellis Lever, against whom an action was pending for corrupting the former Gas Manager of the Salford Corporation by offering him bribes, had been permitted to have a private interview with that person while in prison; and whether such permission was in accordance with the prison rules.

Mr. HOWELL inquired whether the right honourable gentleman was aware that no charge of corruption had been made against Mr. Ellis Lever, except by the felon now in gaol for taking money belonging to the Corporation; whether any charge was made during the trial of Hunter that Mr. Lever had been guilty of any misbehaviour; and whether the charge did not absolutely rest at the present moment on the statement of Hunter.

Mr. MATTHEWS: As to the question the honourable member opposite has just put to me, I can only say that I have not looked into the evidence with reference to the subject on which he wishes for an answer; and I should require notice before I could give one. With regard to the question of my honourable friend (Mr. Howorth), I have to say that the Prison Commissioners granted an order to a solicitor—Mr. Godfrey Rhodes—and to Mr. Lever, his client, to visit Hunter in prison; a representation having been made to them in writing by the solicitor that the prisoner was a material witness for the defendant in the action, and that the visit was necessary in the interests of justice. I am informed that the permission was in accordance with the prison rules.

Friday, Feb. 21.

The Examiners reported compliance with further Standing Orders in the case of the following Bills:—Luton Gas Bill; Partick, Hillhead, and Maryhill Gas and Electricity Bill; Pontypool Gas and Water Bill.

METROPOLIS WATER BILL.

The order for the second reading of this Bill on April 2 was read and discharged, and the Bill withdrawn.

MR. ELLIS LEVER'S VISIT TO THE CONVICT HUNTER.

Mr. HOWORTH asked the Secretary of State for the Home Department whether, in view of the opportunities for further corruption afforded thereby, he proposed to cancel or alter a prison rule under which a person who was charged with bribing a Corporation official convicted of embezzling public money was allowed to have access to the person so charging him, without the intervention of a third person; and whether, as a matter of fact, the Prison Board had forbidden Mr. Ellis Lever to have further access to the prisoner Hunter, except in the presence of a third person.

Mr. MATTHEWS: When Mr. Rhodes and his client, Mr. Lever, saw the prisoner Hunter, it was in the presence and hearing of a warder; permission having been obtained on the grounds I stated yesterday. The Prison Commissioners have since refused to allow a second interview of any kind, unless a statement made to them by the Town Clerk of Salford can be refuted—viz., that the prisoner could not possibly, in any sense, be a witness for the defendant; and that a further interview would be opposed to the interests of justice. I am now considering with the Prison Commissioners what general practice shall be adopted in future with regard to visits to prisoners by solicitors and others.

THE POLICE AND THE RECENT STRIKES.

Mr. CUNINGHAME GRAHAM asked the Secretary of State for the Home Department whether his attention had been called to the alleged interference by the police with pickets during the recent gas strike; and whether in so doing they were acting under orders or on their individual responsibility.

Mr. MATTHEWS said his attention had not been called to any such alleged interference; but if the honourable member would put a question on the paper, specifying the date and place, he would make any further inquiry he might desire.

LOCAL GOVERNMENT AND GAS AND WATER SUPPLY.

In the course of the debate on the Queen's Speech, an amendment was moved by Mr. Stansfeld, expressing regret that no intention had been announced in the Speech of proceeding during the present session to the constitution of District and Parochial Councils in Great Britain, or of carrying further in the Metropolis and elsewhere the organization and powers of local government. During the discussion of this amendment, several references were made to the transfer of gas, water, and electric light undertakings to local authorities.

Mr. J. ROWLANDS urged the Government to supply the necessary adjunct to their Bill of 1888 by establishing the proposed system of district councils, and so perfect the machinery of local government in the Metropolis that they might be able to deal effectively with the great social questions which so deeply affect the welfare of the people.

Mr. CAUSTON said a thorough reform was required with regard to local matters, and no tinkering or repairing would do any good. With regard to the extended powers of the County Council, they wanted at least all the powers possessed by other municipalities of the kingdom. With regard to water, gas, and electric lighting they also expected to have these powers as soon as possible. It would be more economical, and would get over many existing difficulties, if these matters were in the hands of an elective body.

Mr. BARTLEY pointed out with regard to the great desire of which they heard, that the County Council should obtain possession of the gas, water, and electric light undertakings, that the very gentlemen who now advocated this had, in 1880 prevented the works of the Water Companies from being bought up at a sum immensely less than that which would have to be paid now.

Mr. RITCHIE, in the course of his reply, said, with regard to London, the Government were aware that legislation was not complete, and when the opportunity arose the Government were as anxious as honourable gentlemen opposite to proceed with it; but it was admitted that they would have to deal in a London Bill with lodgers, charities, poor law, asylums boards, gas, water, extra-parochial authorities, hackney carriages, and police. No doubt the Government had had offers of assistance from honourable gentlemen opposite if they would attempt to deal with these matters; and, this being the case, they would be glad to enlarge their programme and carry out the work they were extremely anxious to complete.

The amendment was negatived.

THE SALFORD SCANDAL.

Mr. HOWELL gave notice of his intention to ask the Home Secretary on Monday, Feb. 24, "whether, considering the charges of gross corruption in connection with the gas contracts of the Salford Corporation, the fact that its late Engineer is now undergoing a long period of imprisonment for participation in the frauds which were perpetrated, the charges that are now being made of other acts of corruption, and the accusations against members of the Corporation of complicity in attempting to condone the offences of those who were parties to the frauds, the Government will consent to the appointment of a Commission to inquire into the allegations that have been made, and the mode of contracting carried on by the Gas Committee of that Corporation."

The Expenditure on the Vyrnwy Water-Works.—The Water Committee of the Liverpool Corporation have issued their usual quarterly return relating to the expenditure on the Vyrnwy works. During the three months ending Dec. 31, there was spent on the Vyrnwy embankment works and works in connection with the reservoir, £4765; the Vyrnwy quarry, £3448; the aqueduct, £15,458; land and easements, £797; maintenance of the Vyrnwy estate, £1768; Vyrnwy Hotel, £977 (the net total on the last item is given at £3671 18s. 10d.)—making a grand total up to date of £1,990,191. The contracts entered into since the last return include that with Messrs. Cochrane and Sons, of London, for the completion of the Mersey Tunnel, £14,000; and Messrs. T. Piggott and Co., of Birmingham, for steel tubes for the Vyrnwy aqueduct subway under the Manchester Ship Canal, £2463.

LEGAL INTELLIGENCE.

GREENWICH POLICE COURT.—Thursday, Feb. 20.

(*Before Mr.* R. H. B. MARSHAM.)

Redgrave v. South Metropolitan Gas Company.—Gas-Works and the Factory Acts.

This was a case in which two summonses were taken out by Mr. A. Redgrave, Her Majesty's Chief Inspector of Factories, against the South Metropolitan Gas Company. The first set out that the Company, being occupiers of a factory at East Greenwich within the meaning of the Factory and Workshop Act, 1878, did employ a young person named William Horne on Sunday, the 19th ult.; and the second was for failing to send to the Inspector of Factories for the district written notice of an accident on the above-named day, whereby Horne lost his life.

Mr. REDGRAVE attended in support of his case; Mr. PASSMORE appeared for the Company.

Mr. REDGRAVE said he understood from Mr. Passmore that his defence was that gas-works did not come within the meaning of the Factory Act. The Company were charged, as occupiers of a certain factory within the meaning of section 93 of the Act, with employing a young person under 18 years of age, contrary to section 21 of that Act, on a Sunday; such employment resulting in the death of the person. No notice was sent to him (Mr. Redgrave) of the accident or of the death. As proof that gas-works came under the Act, he would mention that steam power was used in the processes carried on there. The primary work done was the generation of illuminating gas for public use. Coke also was obtained from the retorts; and tar and ammoniacal liquor were produced in the manufacturing process carried on. The Act included any place where any manual labour was exercised in the way of trade or for purposes of gain, or premises "used for the adapting for sale of any article."

Mr. MARSHAM: Is gas an "article"?

Mr. PASSMORE: That is my point.

Mr. REDGRAVE said that in the manufacture of gas there were obtained coke, tar, and ammoniacal liquor.

Mr. MARSHAM: Has there been any case on the subject?

Mr. REDGRAVE said there had not been a case before the High Court, and no decision had been given on the point. The Corporation of Nottingham took some proceedings, but withdrew them. He contended that gas, by the time it reached the public, was an article of consumption.

Mr. MARSHAM: It is not tangible.

Mr. REDGRAVE: Many things are not tangible.

Mr. PASSMORE: Webster defines an article as "a particular one of various things."

Mr. REDGRAVE drew attention to the provisions of the Act, which applied to places where steam power is used in the processes carried on, and added that coke was obtained in the Company's process.

Mr. PASSMORE: Coke is the refuse. The Act applies to "textile and non-textile factories."

Mr. REDGRAVE said it was provided that no place should be exempted by reason of its being in the open air. It was at first thought that the Act would not apply to open-air factories. He then proceeded to call witnesses, remarking that he had had to summon the defendant Company's servants to prove his case.

Mr. PASSMORE said they would render every assistance they could.

Mr. *J. Tysoe*, Manager of the Company's East Greenwich Station, examined by Mr. REDGRAVE, said the works were enclosed by a fence 6 feet high. Their primary occupation was the conversion of coal into gas; but other products were obtained. Coke was the residuum, and was taken away and sold. Having described the process of gas manufacture, he added that the tar fell into tanks and ran away to the adjoining chemical works of Messrs. Forbes, Abbott, and Lennard, to whom it was sold. Ammoniacal liquor was obtained in the process of gas manufacture; and this was sold also. In the end, the gas was left in the holder.

Mr. REDGRAVE: Do you give the gas away?

Witness: No; we do not give it away.

Mr. REDGRAVE: You sell it to the public?

Witness replied that they did. He added, in answer to further questions, that they used steam power to exhaust the gas, and drive it into the condensers. They also pumped water by the aid of steam power. He knew that Horne was employed at the works on the 19th of January, and remembered the fact that he was killed.

Cross-examined by Mr. PASSMORE: He had been at East Greenwich for four years, during which time he had not received any visits from the Inspector of Factories. The works would not be carried on except for the manufacture of gas. The coke, tar, &c., were bye-products, and rather than waste them the Company sold them. Horne was engaged during the recent strike, and was presumed to be over 18 years of age. The Company had their own Special Act, by which they were regulated.

William Horne, father of the deceased, said his son's age was 16 on Feb. 27 last year. Witness was not in the works at the time of the accident.

Thomas Edward Brett, engine-driver in the employ of the Company, said that the deceased worked with him at the East Greenwich station on Sunday, Jan. 19, as fireman of the locomotive. They were employed in drawing the coke out of the coke-hole and taking it to barges to go away.

This was the case for the prosecution.

Mr. PASSMORE said his contention was that gas was not an "article" within the meaning of the Act. The Act had been in operation for twelve years, and it had never been suggested that gas-works came under its provisions.

Mr. REDGRAVE said the Factory Inspectors had paid twelve visits to gas-works in that period.

Mr. PASSMORE remarked upon the very few visits paid, and said it had never been supposed that gas-works came under the Factory Act. Accidents had arisen, and inquests had been held on persons killed; yet this was the first summons taken out. They heard that at Nottingham, rather than go to the expense of fighting the question, the Corporation had withdrawn from the case. Nothing was referred to in the Act of the nature of gas-works; and the term "factory" was held to mean "a textile or non-textile factory." Gas-works could not come under this head. An article manufactured referred to something one could take hold of. If they opened a thing containing gas, the latter disappeared; they could not take hold of it, and therefore it was not an article.

Mr. REDGRAVE remarked that it could be sold.

Mr. PASSMORE acknowledged that it could.

Mr. REDGRAVE: This boy was killed while drawing the coke out; and coke must be an article.

Mr. PASSMORE had no doubt Mr. Redgrave wanted a legal opinion on the subject.

Mr. REDGRAVE said he had never had a fatal accident before him until now.

Mr. PASSMORE said he admitted the facts of the case, and relied upon his argument. Mr. Tysoe had never before had a visit from the Factory Inspector.

Mr. MARSHAM said he should be prepared to hold that the case came within the Act; but if Mr. Passmore wished for an adjournment, he would grant one for the production of scientific witnesses if desired. Or he would decide against Mr. Passmore and grant him a case.

Mr. PASSMORE did not think he could call any witnesses. The point was whether or not gas was an "article."

Mr. MARSHAM said he would allow an adjournment to enable Mr. Passmore to consult scientific, chemical, or other dictionaries on the point. He was quite prepared to decide that the works came within the Act.

Mr. PASSMORE said the articles named—coke, tar, and ammoniacal liquor—were clearly the refuse; and the business was not carried on for the purpose of making and selling them.

Mr. MARSHAM: But they are valuable parts.

Mr. REDGRAVE said that if the Act had been observed, the boy would not have been killed. It would be equally satisfactory to decide against the Company and let Mr. Passmore take a case on the subject.

Mr. PASSMORE: I will accept your decision and take a case.

His WORSHIP then fined the Company 5s. and 7s. costs in the first case, and 5s. and 7s. 6d. costs in the second.

On the following day the Company were summoned at the Lambeth Police Court for a similar offence to that mentioned above, in respect of their Vauxhall works. The contentions, and the arguments in support thereof, being the same as in the Greenwich case, the Magistrate (Mr. Partridge) decided to adjourn the matter pending the result of the other proceedings.

The Supply of Hydraulic Power.—At the meeting of the General Hydraulic Power Company, Limited, which was held last Wednesday, the Chairman (Sir J. Allport) gave some interesting particulars as to the progress of the Company, which, he said, had exceeded expectation. The number of machines at work on Dec. 31, 1888, was 814; on Dec. 31, 1889, 1022. The number set to work in 1888, was 205; in 1889, 208. The number contracted for in 1888 was 909; in 1889, 1207. This showed that the demand for the Company's power was increasing at a very satisfactory rate. The number of gallons of water pumped in 1888 was 12,000,000, against 163,883,000 in 1889. A gratifying point in regard to this pumping was that in 1888 the percentage registered was 93·7, against 95·5 in 1889; showing that the percentage of loss was gradually decreasing as the consumption increased. As to revenue, taking the last quarter of 1888, the amount was £4852; for the same period in 1889, £6284. The gross receipts had risen from £19,300 to £25,600. This, again, was very satisfactory. The price per 1000 gallons had risen from 2s. 11·5d. to 3s. 1·31d. The profit per 1000 gallons had increased from 20·4d. to 21·83d., or nearly 22d. The working for 1889 had resulted in a gross receipt for power of £25,662. The available balance was £15,851; including £1244 brought from the last account. After providing for interest on debentures, Directors' and Auditors' fees, and £2000 for depreciation, the Directors proposed that out of this sum a dividend at the rate of 5¼ per cent. per annum be paid, absorbing £13,749; and that the balance of £2102 be carried forward. This was agreed to. At an extraordinary meeting subsequently held, it was decided to increase the capital by the issue of 40,000 new shares of £5 each.

The Heywood Town Council and their Former Gas Manager.—At the last meeting of the Heywood Town Council, there was further discussion in reference to the differences which had arisen between the Gas Committee and the former Manager of the gas-works (Mr. H. Hawkins), and which, as may be remembered, gave rise to a rather stormy debate at the preceding meeting (see *ante*, p. 74). Mr. Healey moved the following resolution:—"That, in the opinion of this Council, the report of the Sub-Committee appointed on Dec. 18, 1889, to investigate into the irregularities in connection with the erection of the new retort-house, and the general conduct of the late Gas Manager in connection with the same, is incomplete; and the same Sub-Committee be requested to furnish the Council with a more complete report in writing thereon." He said that one reason for his moving the resolution was the refusal of the Mayor on the last occasion, to allow him to put certain questions; and another was that the Council were dissatisfied with the report. The questions he intended to ask related to a letter from the contractors for the new retort-house, the authorship of the plans, and the connection of Messrs. Buckley and Hodgkinson (members of the Committee) with the purchasing of bricks. He criticized certain deductions made by the contractors from their account. The whole thing looked suspicious from the commencement of the erection of the retort-house to the time Mr. Hawkins left them. Mr. Hodgkinson having given some explanations as to the bricks, Mr. Buckley contended that by the action of himself and a few of the members of the Corporation the town, instead of losing, was saved £2000 or £3000. Mr. Alderman Cronshaw suggested that the words "to make further inquiries" should be omitted from the motion. After some critical remarks from Mr. Chadwick, the resolution was amended as suggested, and carried.

MISCELLANEOUS NEWS.

THE BOARD OF TRADE REPORT ON THE GAS, &c., BILLS AND ORDERS OF THE PRESENT SESSION.

The Board of Trade report on the Gas, Water, and Electric Lighting Bills and Provisional Order applications for the present session was issued last week. It shows that the number of Bills relating to the supply of gas is eleven—nine for England and two for Scotland. Three of these Bills also contain provisions relating to the supply of water, and two to electric lighting. The capital proposed to be raised is £430,000 by shares, and £158,260 by loans—total, £588,260. There are eight Bills which relate to electric lighting—six for England and two for Scotland; the amount of capital proposed to be raised on loan for the two countries being £20,000 and £50,000 respectively. There are 21 Bills relating to water supply (all, with one exception, being for England); the total capital asked for being £549,560 by shares, and £3,067,190 by loans—total, £3,616,750. Provisional Orders to the number of 22 have been applied for in respect of gas and water supply, and 161 in respect of electric lighting. The capital proposed to be raised under these Orders is: For gas, £132,125; for water, £127,750; for gas and water combined undertakings, £25,000—total, £284,875. For electric lighting the proprosed capital is £9,242,828. As compared with last year, the number of Gas Bills has increased by one; that of Water Bills has fallen off to the extent of 14—the total for the two classes being now 32, as against 45 in 1889. The capital required for gas purposes is £76,307 more, and that for water £1,034,250 more than last year. For Gas and Water Orders, the capital proposed is £71,742 more than in 1889. The applications for Orders in respect of electric lighting show an enormous increase—161 as against 17; the capital proposed to be raised under them being £8,244,828 more than last year.

BRENTFORD GAS COMPANY, LIMITED.

The Half-Yearly Meeting of this Company was held last Friday, at the Charing Cross Hotel—Mr. H. C. Ward in the chair.

The Secretary (Mr. W. Croxford) having read the notice convening the meeting, it was decided to take as read the Directors' report, a summary of which appeared on the 11th inst. (p. 255).

The Chairman, in moving that the report and accounts be received and adopted, said he need hardly tell the proprietors that the past half year had been one which had caused a great deal of anxiety and trouble to the Board and the officials; and he would take this opportunity of acknowledging the very great assistance of the latter—especially of their Engineer, Mr. Morris, who had managed the men during a trying and difficult time in a very admirable manner. They were rather fearful that the men would have left their employment; but the Board were prepared to take the proper steps if such a thing had occurred. The men, however, had their demands met in a liberal spirit; and were immediately granted the change from the twelve-hour to the eight-hour shift. It would, he continued, not be right for him, in addressing the shareholders on this occasion, to omit bearing testimony to the wonderful powers and capital manner in which Mr. George Livesey had met the trying circumstances through which he had passed. It appeared to him (the Chairman) that the men made a mistake, and had misconceived and misunderstood Mr. Livesey in every way. He was sure there was no gentleman on any Board of Directors in the kingdom who was more kindly intentioned towards his employees than Mr. Livesey. When he proposed the bonus scheme, he had no idea to strike at the Gas Workers' or any other Trades Union. But the men so interpreted it; and the result was they resolved to go out unless he withdrew the scheme. It could not be supposed that he would withdraw it; and the result was that many of the South Metropolitan Gas Company's men—some of them old and trusted workmen—lost their employment, and new hands came in. These men had put their trust in Mr. Livesey; and it would, of course, be improper for him, now that the strike had ended, to throw them on one side, seeing that they had helped him in the time of need. He (the Chairman) could only hope that the labouring portion of their own staff would call good sense to their assistance; and then they would not experience any foolish action on their part. Capital could not do without labour; and labour could not do without capital. Of course, the changes that had been made had seriously interfered with the profit of the half year; the increase of wages being not less than 30 per cent. In despite of this, the electric light, oil, and so on, the volume of the business continued steadily to grow; and it was necessary for them to make a substantial addition to the storeage and manufacturing power of their works. In order to do this, they had commenced the excavation for a tank. The holder would be one of the largest in the kingdom; and would be capable of containing something like 4 million cubic feet of gas. In addition to this, they were trying, on a small scale, a new system of inclined retorts, which they hoped would be the means of saving a great deal of labour to the stokers, who sometimes complained of the arduous nature of their work. They trusted that they would be able to report, at the next meeting of the shareholders, that the experiment had been a success. Further than this there was the process—largely in operation in America, and which might to some extent be of assistance to the Company in case of emergency—by which a very rich gas was generated by means of producers and Russian oil. They would take steps to have two or three sets of these appliances on the works—in readiness to fly to if occasion should demand it. These things would require a considerable amount of money. If the shareholders would study the capital account, they would find that it was indebted to the profits to the extent of £10,000 or £11,000; and this they would have to repay. It would be necessary therefore to call up more capital; and the Board intended to issue £25,000 of 1881 stock. This they proposed to issue at a price of £150 as a minimum; the market price being £160 to £164. Those who paid most liberally would, of course, be the fortunate recipients of this stock. With reference to the clause in the report, which stated that a resolution would be submitted to the proprietors to authorize additional capital, it must not, the Chairman said, be understood that this alluded directly to the sum of £25,000, which it was proposed to raise. The shareholders gave the Board power to issue £187,500 of stock. They had sold £125,000 of the 1881 stock. This had produced an amount, with premium, of £157,000; so that, when they sold the £25,000, if they obtained at the very lowest £37,500, they would exceed the amount they were authorized by the shareholders to raise in November, 1881. Therefore it was necessary they should now have sanction to raise, from time to time, a further sum. Turning to the accounts, he said he considered they were very satisfactory; but it should be remembered, in making comparisons with the six months ending December, 1888, that they had had unpleasant features to meet in the past half year. The extra cost of labour was about £3000; and the price of gas had been 4d. per 1000 cubic feet less, representing close upon £8000 for the half year. The report showed that they were prepared to pay a dividend at the rate of 12½ per cent. per annum on the consolidated stock, and at the rate of 9½ per cent. per annum on the new stock. If they took the figures for the whole of the year, it would be found that these dividends had been paid out of the profits; and that £880 had been carried to the undivided balance.

Mr. J. Orwell Phillips seconded the motion.

The Chairman, replying to questions, said that the new works would be erected at Southall, as they had more space there. Their contracts for coal would run up to June, 1891. In giving some particulars concerning the manufacture of water gas, he stated that he knew of one process by which, with the same number of retorts, and the addition of some new appliances, an output of 1 million cubic feet of gas under the old system of working had been increased to 6 millions.

The motion was unanimously carried.

The dividends recommended having been declared,

The Chairman moved—"That the Directors be, and they are hereby authorized, in pursuance of the powers conferred by the Brentford Gas Order, 1881, to raise from time to time as they think expedient a sum, not exceeding in the whole £187,500 further capital by the issue of new stock, 1881, to be paid up in full at the time of acceptance, or to be called up by such instalments and at such times respectively as the Directors may think fit, and as in the said Order specially provided, to form part of the ordinary capital of the Company, to be subject to the same conditions, and entitled to the same privileges, as the existing ordinary stock of the Company. That such stock be offered by the Directors for sale by public auction or tender in accordance with the said Order in such amounts and proportions, in such manner, at such times, and subject to such conditions of sale and provisions, as, in conformity with such Order, the Directors shall from time to time determine."

Mr. Phillips seconded the motion; and it was carried *nem. con.*

The retiring Directors (Sir Richard Wyatt and Mr. E. Walmisley) and Auditors (Messrs. Bradfield and Field) were re-elected.

The Directors' services were duly acknowledged by the shareholders; and the proceedings then terminated.

CROYDON COMMERCIAL GAS AND COKE COMPANY.

The Half-Yearly Meeting of this Company was held last Thursday, at the Offices, Katharine Street, Croydon—Mr. Charles Newton in the chair.

The Secretary (Mr. W. J. Russell) read the advertisement convening the meeting; and it was agreed to take as read the Directors' report and the statement of accounts, which were noticed in the Journal last week, (p. 296).

The Chairman then moved the adoption of the report and accounts; and in doing so, he first referred to the paragraph in the former in which the Board announced, with much regret, the death of one of their oldest colleagues—Mr. Edward Berney. In that regret, he was sure the shareholders would all join. Mr. Berney was one of the two remaining Directors (Mr. W. Hyslop being the other) who assisted in the formation of the Company in 1846. In those early days, to start a Company like theirs must have been a work requiring much patience; and, he supposed, it was work of rather a discouraging character—certainly, as regards Croydon it was unremunerative. He therefore thought that due notice should be taken of the loss of a gentleman who persevered in aiding in the promotion of the prosperity of the Company from its earliest institution until the present time. The Board had had a letter prepared and forwarded to the family of Mr. Berney, offering them their condolence and sincere sympathy. Turning to the working of the half year, he said that the increased consumption had been upwards of 8 million cubic feet, or at the rate of 4½ per cent. During the six months, they had sent out, and fixed free of cost, more than the usual number of cooking and heating stoves. Above 400 stoves and new meters had been fixed; and he believed the number would continue to increase in a greater ratio by the means the Board had adopted for popularizing the use of gas. A large room had been erected, in connection with the offices, for the exhibition of gas stoves and other appliances; and they intended having cookery lessons during the current half year. They had also adopted a new plan for creating consumption among those persons who lived in houses of a rental of £30 and under a year. The Company had agreed to supply them with fittings and a small boiling-stove, charging a nominal weekly rental as interest for the outlay; and by the aid of a prepayment meter, would furnish them with a quantity of gas week by week. As far as it had been tried, the idea seemed to be much appreciated. Regarding the future, the Chairman said that, notwithstanding the increase of wages in the labour market, the advance in the price of materials, and the almost certain higher rate they would have to pay for coal, the Board had not hesitated to follow on the present occasion their policy of the last few years, in reducing the charge for gas; and they had decided to lower it, from Lady-day next, to 2s. 10d. per 1000 cubic feet. The result of the half-year's working was they were able to recommend that the usual dividend be paid at the rate of 14 per cent. per annum on one portion of the capital, and 11 per cent. on the remainder; leaving a small sum to carry forward to the undivided balance, which would help them to meet any loss that might be sustained in consequence of the reduction in price. With regard to the

capital account, there had only been £1144 expended for new mains, meters, and stoves; and as to the revenue account, there was a total increase of about £1100 in the receipts, compared with the second half of 1888. Notwithstanding the last reduction in price (representing for the six months about £800), in consequence of the increased consumption, about £335 more had been received for gas. There was also a small increase in the rental for meters and stoves, and about £750 in the receipts for residuals. On the debit side of the account, there was an increase in the manufacturing department for extra coals and for the additional wages granted to the stokers, amounting to £1220. The profit earned was £11,630; and, as he had said, this would enable them to pay the full parliamentary dividends and carry a balance to the undivided profit. He then mentioned that they had taken, partly from the latter and partly from the profits, the sum of £885 to make up the insurance fund to the full extent allowed by Act of Parliament; and so long as this fund remained intact, they would realize by way of interest nearly £300 to be added to the profits. As to the reserve fund, it now stood at a very respectable amount, and was increasing at the rate of £700 a year by its own interest.

Mr. W. HYSLOP seconded the motion.

Mr. H. J. ROBUS inquired how many consumers the Company had on the prepayment meter system. He also asked how it was that there was such a wide difference in the quantity of unaccounted-for gas for the past two half years. For the first half of the year, the amount was 5,536,000 cubic feet; and in the second half, 12,000,000 feet.

The CHAIRMAN replied that they had now between 30 and 40 customers on the prepayment system. As to the unaccounted-for gas, in the second half of 1888, the percentage on the make was 5·56; and in the past six months, 5·72. Their average unaccounted-for gas was 5 per cent.

On the motion of the CHAIRMAN, seconded by Mr. J. MARSHALL, the dividend recommended was declared.

Resolutions were then moved respectively by Mr. C. HUSSEY and Mr. C. R. MEAD, and seconded in each case by Mr. A. T. LAYTON, by which the Chairman and Mr. H. Palfrey Stephenson (the retiring Directors) were re-elected.

The retiring Auditor (Mr. J. C. Benwell) having been re-appointed,

The CHAIRMAN moved that the salary of the Secretary be increased by £50 per annum. Mr. Russell, he said, had been an officer of the Company for about 27 years; and he had not had an advance in his remuneration for the past seven or eight years, During this period the consumption of gas had grown at the rate of about 20 millions a year.

Mr. E. HYDE seconded the motion, which was unanimously agreed to.

The SECRETARY thanked the shareholders very warmly for having acceded to the Directors' recommendation.

The usual complimentary vote was passed to the Chairman and Directors, on the motion of Mr. LAYTON, seconded by Mr. C. F. HAMOND.

BARNET DISTRICT GAS AND WATER COMPANY.

The Half-Yearly Meeting of this Company was held last Thursday, at the Guildhall Tavern, Gresham Street, E.C.—Mr. JAMES GLAISHER, F.R.S., in the chair.

The SECRETARY (Mr. Alfred Lass, F.C.A.) having read the notice convening the meeting, it was agreed to take as read the Directors' report and the statement of accounts for the past half year, some particulars from which were given in the JOURNAL last week (p. 301).

The CHAIRMAN said he did not think it would be necessary for him to detain the shareholders for any length of time, as the report and accounts were very satisfactory; and showed progress in both branches of the business. With respect to the gas undertaking, the first item in the revenue account showed that there was an increase on the amount they had ever previously paid for coals. Wages also had advanced; and he was persuaded that this was not a merely transitory increase, but that it would continue. On repair and maintenance of the works, they had spent £136 above what they did in the corresponding period of last year; but this implied that the Board and the Engineer (Mr. T. H. Martin) had their eyes directed to the permanence of the works. The repair of mains and service-pipes had cost £146, against £73. On the other side of the account, the receipts for gas were £5870, compared with £5897—nearly an equal amount. This he regarded as very satisfactory, because the price of gas in the past half year had been 3d. less than in the corresponding period of 1888; and this reduction represented a concession to the consumers of £338 in the six months. Every reduction they made had stimulated the consumption of gas; and the increased amount sold last half year was no less than 1,700,000 cubic feet. They had done exceedingly well in connection with their residuals; having realized about £286 more. The coke had produced an additional £116; but the extra sum paid for coal was more than this sum. He felt confident that, if coal went higher in price, the increased amount realized by coke would never counterbalance it; but on this occasion it had nearly done so. Coming to the critical point, they found that the profits upon the half year had been £2771, as compared with £2956, or a loss of £185. Turning his attention to the water accounts, the Chairman said these showed a satisfactory advance—there was a constant increase of consumers and of water supplied. All the figures indicated progress; and the profits for the six months stood at £4552—being about £900 more than in the preceding half year. To show how this portion of the Company's business had expanded, he mentioned that in 1883 they had about 3000 consumers; now there were something like 6000. The revenue for water in 1883 was £9000; now it was £13,000. As to the progress with respect to gas, in 1883 they had 1100 customers; now they had 1500. He hoped that the reduction in price would be the means of inducing others to consume gas. Viewing their affairs from all sides, he considered they were in a sound position. From the profits they were able to pay the dividends proposed, and to carry something forward. The shareholders had not had an increase of dividend since 1883. The consumers of gas had had three or four 3d. reductions in price; and therefore they had had the full advantage of the working from the year 1883 to the present time. In conclusion, he moved that the report and accounts be adopted.

The DEPUTY-CHAIRMAN (Mr. Chas. Horsley, C.E., J.P.) seconded.

Mr. PEAT asked whether the Company were likely to feel any loss in the future by the use of the electric light in Barnet.

The CHAIRMAN said he did not think they had anything to fear from the electric light. With reference to the development of the consumption of gas, he might mention that he was old enough to remember that in the early years of gas supply, it was only the higher stratum of society that used gas; and when the stratum below was tapped, it was looked upon as a very successfnl thing. But there was a stratum below that (and a very numerous one) which had not been tapped; and the Directors would have to consider how to approach it. If they could see their way clear, the Board might consider it advisable to give the whole or part of the fittings for use in small houses; and when once they put the fittings into them, they would be certain of a large additional consumption.

Mr. WAKEFIELD congratulated the Board on having made a move in the right direction, in giving the shareholders an extra ½ per cent. dividend. Ever since he had held shares—nearly sixteen years—they had not gone beyond 7 per cent. He referred to the development of the Barnet district recently; and afterwards inquired whether the Board had given any attention to the question of manufacturing water gas, and enriching it for illuminating purposes.

The CHAIRMAN, in reply, said that when he was in New York, the question of water gas was brought very forcibly before him by a friend; and he did not think it would be prudent on his part to sanction the introduction into a district like Barnet of a gas which was reported to be so fatal. As to the dividend not having been previously increased, it must be remembered that they had had a great deal of expense in connection with the water-works; but these were now completed, and the Company would reap the benefit of them. Answering a further question, the Chairman stated that he had been informed that there was only one private consumer of electricity in Barnet.

The motion was carried.

On the motion of the CHAIRMAN, seconded by Mr. HORSLEY, a dividend was declared at the rate of 7½ per cent. per annum on the "A" and "C" stocks, 6½ per cent. per annum on the "B" stock, and 5½ per cent. per annum on the "D" capital (water) shares.

Resolutions were passed re-electing the retiring Directors (Messrs. Horsley and Massey), and the retiring Auditor (Mr. F. Lennard); and subsequently the services of the Chairman, Directors, and officials were acknowledged in a suitable manner.

CAGLIARI GAS AND WATER COMPANY, LIMITED.

The Ordinary General Meeting of this Company was held last Tuesday, at the London Offices, No. 3, Lothbury—Mr. JOHN AIRD, M.P., in the chair.

It having been agreed to take as read the Directors' report and the accounts for the past year, the chief features of which appeared in our issue of last week (p. 291),

The CHAIRMAN at once proceeded to enlarge upon the matters dealt with in the report. He said that he was pleased to be able to assure the shareholders that the position of the Company was in every sense satisfactory; for while they had happily been able to give entire satisfaction to the authorities at Cagliari both in respect to the supply of water and gas, they had maintained their dividend, and generally their financial condition had improved. There had been a moderate, but gratifying increase in the receipts both on account of gas and of water. The unaccounted-for gas was less than in the previous year; and this in spite of the natural difficulties which presented themselves in Cagliari in consequence of the hilly ground. Upon the make, the unaccounted-for gas stood at 5½ per cent. The amount standing to the credit of the revenue account would have been larger than it was but for the damage which the Company's property sustained at the time of the cyclone which visited the province in October last. Fortunately, the staff were able immediately to put the works in a state of repair. In connection with this matter, he was sure the shareholders would approve of the action of the Directors in assenting to a suggestion of their Engineer (Mr. Simmelkjor) that a contribution of £200 should be sent to the authorities to assist in relieving the unfortunate sufferers by the cyclone. In regard to the small addition in the item of law charges during the year, he ought to mention that this was chiefly due to the necessity that arose to alter the investment of their trust funds, and to put them in a completely satisfactory position in the interests of the shareholders. As to the reserve funds—amounting now to nearly £14,000—these had been invested in Italian 5 per cent. stock. The Board considered they might, and ought to invest as much as that in this security; at the same time retaining the right to place any further sums that might accumulate in any other security. As to the water supply, he expressed the confident opinion that it was one of the most perfect supplies of water that could possibly be given to any city; hence the approval with which the Company's operations had always been regarded by the local authorities. Their reservoir was of great depth (65 feet); and there was no doubt that water supplied from a reservoir of that enormous capacity was far superior in quality than when taken from a shallow source. Adverting to the gas portion of the business, he said they had benefited considerably from the increased price of coke. During the year an effort was made to light the Opera House at Cagliari with the electric light; and although considerable expense was incurred in trying to bring this about, those who had the matter in hand at last became so discouraged that they decided to give it up. Their Company were, therefore, in complete possession of the field for the supply of artificial light. It would interest many of their gas friends to know that, when Mr. Simmelkjor was recently in this country, the Directors asked him to visit Rheims and report on M. Coze's system of inclined retorts—a system which was about to be adopted to a very great extent by the Metropolitan Gas Companies, and in several large works in the provinces. He would not weary the shareholders by reading the details of their Engineer's report, interesting as they were, both in regard to the description of, and the results realized by, them. He would, however, read the short paragraph which concluded the report, and which seemed to put most clearly the advantages of the invention. Mr. Simmelkjor said: "The beauty of the invention is its simplicity.

Fortunately for M. Coze, he has aimed at nothing unobtainable. He has, with the very simplest means, obtained very important advantages —viz., (1) Considerable saving of labour. And what in the present state of agitation is even more important (2), no necessity for skilled labour. Any man who has strength enough to move a wheelbarrow can work the system. (3) The coal is distributed more evenly and much quicker than the best stoker could do it under the old system. Consequently, there is a greater yield of gas, less fuel is used, and there is less wear and tear." The Chairman did not think he need add anything further. The accounts, from beginning to end, were exceedingly satisfactory. But there was one thing he would ask the shareholders to bear in mind—that the Company had issued no debentures or preference stock; and therefore the dividend the Directors proposed was paid upon the whole of the capital. This showed that the working of the concern had been good; and it was particularly satisfactory in this respect—that should the revenue at any time fall off, there would be no preference securities of any kind to come in and take precedence in the earnings; but the profits would be always equally divided. He concluded by moving the adoption of the report and accounts.

Mr. F. WIGAN seconded the motion.

Mr. PAYNE observed that by the terms of the concession, the payment by the Government and local authorities in 1897 would be reduced by £2000; and he desired to know what provision the Directors were making against this. In regard to the reserve and sinking funds, he did not question the policy of the Board in investing them in Italian 5 per cent. stock; but personally he did not think it desirable to increase the investment.

The CHAIRMAN said that, as to the reduction in the guarantee which would come into operation in 1897, that would be met to a certain extent by the increased revenue which they hoped to obtain in the meantime, and by adding to the special reserve fund which was created for this purpose. He thought there was a good deal in what Mr. Payne said as to their investments. The Board, however, considered it would be a compliment to the Italian Government if they put a reasonable amount in this 5 per cent. stock.

The motion was then carried.

On the proposition of Mr. J. ORWELL PHILLIPS, seconded by Mr. J. J. BARROW, the payment of the interim dividend was confirmed, and a dividend for the half year at the rate of 8 per cent. per annum was declared, with a bonus of 5s. per share.

Resolutions were then passed, on the motion of Mr. ROBERT KING, seconded by Mr. PAYNE, re-electing the Directors (Mr. C. A. Swinburne and Mr. J. O. Phillips), and the Auditors (Mr. E. O. Coe and Mr. H. Bishop).

A vote of thanks was accorded to the Chairman and Directors for their attention to the affairs of the Company during the year; and the proceedings then terminated.

THE DINSMORE GAS COMPANY, LIMITED.

The Annual Meeting of the Dinsmore Gas Company, Limited, was held, at Liverpool, yesterday (Monday) week—Mr. MALCOLM GUTHRIE in the chair.

The report stated that the Directors, although disappointed by the delay, were still thoroughly satisfied as to the ultimate success of the Dinsmore process of gas making. The past year had been taken up largely in arranging and testing methods for lessening the cost of adapting existing retort-settings to the Dinsmore system. Final arrangements had now been completed, and patents obtained which belonged to the Company—thus lengthening the life of their property. The opinions had been obtained of such eminent authorities as Mr. Thomas Newbigging, C.E., and Professor Foster, and of the Managers of some of the gas-works now using the Dinsmore process—viz., Widnes, Longwood, and Huyton. Their reports were highly satisfactory, and confirmed the Board's opinion as to the value of the process. The process had been, or was being adopted by twelve gas companies or corporations; and the Directors had every belief that many other companies would adopt it. The accounts naturally exhibited items of expenditure only; but the Board had been most economical, without damaging the interests of the Company.

The CHAIRMAN, in moving the adoption of the report, said the Directors had not been able to declare a dividend; but they had lost no ground as regarded the development of the process. Its acceptability by gas engineers, and the knowledge of it and the estimation of it in the gas world had made a considerable advance. He was just as confident now as at first of the great usefulness of the process and its gradual general adoption throughout the country. Gas engineers would find that it did not require any revolution in existing plant. The experiments which had been conducted had now reduced the process to the utmost simplicity of cost and management. The price of coal and cannel had increased throughout the country; and he thought this would lead gas engineers to view with more favour a process of such claims as the Dinsmore.

Mr. W. H. Wilson seconded the motion.

Mr. W. S. BARRETT expressed himself as confident that the Company had a bright future.

Mr. ISAAC CARR said that the process had effected an annual saving in the case of the Widnes Gas-Works of £1700, and the illuminating power had increased from 18 to 19 candles.

Mr. F. PRITCHARD stated that by means of the Dinsmore process he had increased the quality of the gas produced at the Huyton Gas-Works by about 20 per cent.

The report was unanimously adopted.

A Railway Company and its Gas and Water Supply.—We referred last week (p. 291) to the scheme proposed by the Manchester, Sheffield, and Lincolnshire Railway Company for supplying their stations with gas. It appears that the Company also contemplate a private water supply scheme, for they have written to some of the local authorities in similar terms to those employed respecting the gas service. How a "comprehensive scheme for supplying themselves with water at their various stations" is to be carried out, is even more mysterious than the proposals as to the gas supply.

PROVINCIAL GAS AND WATER COMPANIES.

The following paragraphs contain particulars of the working, during the past year or half year as the case may be, of the various Gas and Water Companies mentioned.

Gas Companies.

In submitting for adoption the annual report of the Directors of the Barnsley Gas Company—a brief notice of which appeared in our last issue—at the meeting of shareholders, yesterday week, the Chairman (Mr. E. G. Lancaster) referred to the recent advance which they had made in the price of gas, and pointed out that the accounts fully justified the Directors in taking this step. He called attention to the fact that Leeds, Halifax, and other towns had been compelled to adopt a similar course; and then mentioned that the Board had been obliged to give notice to the Corporation to terminate their contract for street lighting at present rates, in consequence of the advanced prices of coal and the concessions which had been made to the workmen. When the expenses attending the lighting of the lamps, keeping in repair the lamp-posts, and other matters incidental to the carrying out of the contract were defrayed, very little, comparatively speaking, was left for the Company. In alluding to the proposed adoption of electric light, he said he thought the shareholders must be prepared for its introduction next winter; but, so far as they were concerned, there would be no loss whatever. The motion was carried; and a vote of thanks was tendered to the late Chairman (Mr. R. Inns), for his valuable services as a Director for 24 years, during 14 of which he occupied the head position on the Board.

The Bishop Auckland District Gas Company's accounts for the past half year show a balance of £2079, out of which the Directors recommend the payment of a dividend at the rate of 11 per cent. on the original and 8 per cent. on the additional capital; making with the interim dividend paid for the half year ending June 30, a total dividend for the year of 9½ per cent. and 6½ per cent. respectively, and leaving a balance of £311 to be carried forward.

The report which the Directors of the Bristol United Gaslight Company have prepared for presentation to the shareholders on the working of the past half year, is remarkable for its brevity—consisting merely of half-a-dozen short paragraphs, in which the Board mention that, owing to the reduction in the price of gas since July 1 last, the large increase in wages, and the exceptional advance in the cost of coal and other materials, the profit on the half year is materially reduced; and in consequence of this they have been compelled to raise the price of gas 3d. per 1000 cubic feet, to take effect from the 1st ult. Beyond this, there is nothing of general interest in the report; not even a word respecting the most important event of the half year in connection with the Company—viz., the strike of the men, and their complete victory in the course of a few hours. On this subject the shareholders, at their meeting on Thursday, will doubtless call upon the Directors to break silence, and give some explanation regarding their infirm action on that occasion. Glancing through the financial statements accompanying the report, it is seen that the large additional sum entered as carbonizing wages in the revenue account compels the Directors to make a bare confession that there was a strike. The line runs thus:—"Wages (carbonizing), including expenses of strike, £14,998 15s. 3d." This is an increase, compared with the second half of last year, of £2700. It was computed after the strike, that the concessions made by the Directors would represent about £5000 a year; so that, on this basis, the wages for the period the advance was in operation in the half year ought not to have been more than £1200. If these figures are correct, then £1500 is the amount which was wasted by the Board in their abortive fight with the men. Turning now to the results of the working of the half year, the figures in the revenue account will be anything but pleasing to the shareholders. On the sale of gas, nearly £5000 less was received than in the corresponding period of 1888—the figures being £69,503, as against £74,352. One bright feature on this side of the account is the improvement in the amount realized from residuals—£19,355, as compared with £16,753. The aggregate receipts were £90,657; being a decrease of £2790. In nearly every item on the expenditure side of the account, increases are shown; the principal being in coal, about £5000; in carbonizing wages, as already mentioned, about £2710; and repair and maintenance of works, about £6527. The total expenditure was £82,088, as against £64,861; and the balance remaining to be carried to the profit and loss account is only £8569, compared with £28,585. The net revenue account shows a balance of only £12,386 available for division. To pay the dividend recommended (at the rate of 10 per cent. per annum), £9526 will have to be drawn from the reserve fund.

In the report presented by the Directors of the Bury St. Edmunds Gas Company at the half-yearly meeting on the 14th inst., dividends of 12s. per share on the old, and 9s. 6d. and 9s. per share on the new capital, were recommended and agreed to. The accounts accompanying the report showed that the total receipts to the close of the year amounted to £7476, added to which was a sum of £509 the value of the stock in hand, making together £7985. The disbursements came to £3735; and the dividends required £1620. This left £2630 to be carried forward. A vote of thanks was accorded to the Manager (Mr. A. Mitchell), whose services were referred to in terms of praise by the Chairman; and also one to the Secretary (Mr. H. J. Salmon).

The Directors of the Cork Gas Consumers' Company, in the report presented to the shareholders at their half-yearly meeting yesterday, announced steady progress in the business; the quantity of gas delivered in the second half of 1889 showing an increase of 4 per cent. as compared with the corresponding period of 1888. Although the price of gas supplied for engines and large manufacturing concerns has been reduced 10d. per 1000 cubic feet, and for cooking and heating purposes by half this amount, the rental from private consumers was £514 better; while the income from the public lighting showed an advance. As the Company have made contracts in advance for coal, the great rise in price has not as yet affected them to any important extent; while the returns for residuals have been very good, although not quite equalling the percentage of some former periods. The other items of expenditure, with one exception, were slightly less than those for the second half of 1888. Rates and taxes alone increased—being £63

more than those to December, 1888. For the year 1889, the Company's rates and taxes amounted to £2446—an immense charge on a small business, being nearly 3¼d. per 1000 cubic feet on all gas sold, or nearly three times as much as is paid in some places. The Secretary (Mr. Denny Lane), who signed the report, reminded the shareholders that a Company calling itself the Irish House-to-House Electricity Company, "although it neither counts a single Irish shareholder, nor holds a shilling of Irish capital," had applied for a Provisional Order to supply electric light in Cork; and the application had been opposed by the Corporation. The price proposed to be charged for electricity was, he said, so high as compared with that paid for gas that, even if the Company were established, it could find little support in a community like theirs. But as this "foreign Company," without making any profits for itself, might interfere with the Gas Company's business, they had thought it right to enter an independent opposition on the shareholders' behalf. After adding £850 to the depreciation fund, which now stands at £4442, the balance on the profit and loss account amounted to £5786, out of which the Directors recommended the usual dividend at the rate of 8 per cent. This would absorb £5701; and the balance of £85 would be added to the reserve fund, which would then amount to £11,983.

The Directors of the Dover Gaslight Company, reporting upon the past half-year's working, state that the balance to the credit of the profit and loss account is insufficient, by the sum of £368, to pay the usual dividend. This is mainly owing to the high rates now paid for coal and freights. The Board foresaw the likelihood of this result some months ago; but did not raise the price of gas, as there was a sufficient sum of profit remaining undivided from previous years to meet the probable deficiency, without touching the reserve fund. For the same reason, they do not propose any immediate increase in price, although a similar result must be anticipated for the current half year. The declaration of the full parliamentary dividend (at the rate of 7½ per cent. per annum, less income-tax) is recommended. With the exception of the cost of coal, the position of the Company is highly gratifying. The quantity of gas sold has regained its normal rate of increase. The use of gas for heating and cooking is rapidly extending; and the value of coke and tar has to some extent followed the increased cost of coals. During the half year, the Directors voluntarily raised the scale of wages paid to the workmen, and also provided an appropriate reading-room on the works. The accounts annexed to the report show that the total receipts for the six months amounted to £14,629; and, deducting expenditure, a balance remains of £2246.

The annual report of the Directors of the Elland Gas Company, shows that the profits for the past year were £4040, to which has to be added the balance brought forward from the previous year of £1796. Out of these sums, £1750 has been carried to the reserve fund (being the interest on this fund for the years 1883 to 1889), and £250 to the insurance fund (being the interest on this fund for the same period). An interim dividend at the rate of 10 per cent. was paid for the June half year, absorbing, with the prescribed dividends on the preference shares, and interest on the loan capital, £1955, and leaving £2217 now available for dividends, compared with £3547 in 1888. Out of this the Directors recommend a dividend of 12s. per share on the ordinary capital for the past half year; making 11 per cent. for the year. The report also mentions that, in consequence of the increased consumption of gas, a portion of the purifying plant will have to be replaced and considerably extended. At the Company's meeting last Friday the report was adopted.

The half-yearly meeting of the Kendal Gas and Water Company was held last Tuesday. The Chairman (Mr. W. D. Crewdson), in moving the adoption of the report, referred to negotiations that had been going on between the Directors and the Corporation with respect to the purchase of the Company's property. So soon as a definite offer was received, he promised that the Board would lay it before the shareholders. A dividend at the rate of 8 per cent. per annum was declared.

The proceedings at the half-yearly meeting of the Liverpool Gas Company were not marked by anything of a special character. The Chairman (Mr. Edward Lawrence), in moving the adoption of the Directors' report and accounts, said they were perfectly satisfactory. It would be gratifying to the shareholders to know that the consumption of gas, which during 1888-9 was somewhat stationary, had during the past six months resumed its normal condition, and was going on at an increased ratio, amounting to 3½ per cent. They had a right to congratulate themselves that, in spite of the competition with the electric light, the consumption of gas still went on steadily; and they need not feel in the slightest degree anxious about their property. The question had often been asked as to whether the Company had any trouble with their workmen, and the answer was that they had had none; their relations with them were perfectly satisfactory. It was natural that the men should expect to participate in the improvement in trade; but the changes that had taken place could not affect them as it had other companies, inasmuch as the eight-hour, and not the twelve-hour shift was already in operation. The men, however, requested an advance of wages. A conference was held; and certain proposals were made, with which the men had expressed themselves well satisfied. This involved a considerable additional expenditure in the manufacture of gas, which would be felt during the coming year. There were other matters to be considered, the most important of which was the price of coal and cannel. During the year the prices for these commodities had been steadily rising; and there was a difficulty in obtaining cannel, which added to the cost of production. Therefore the consumers would not be surprised when he told them that they must look forward at no very distant date to a material increase in the price of gas. From the close of the current half year, it was almost certain that the price of gas would have to be raised. There might be changes in the market when they went for their supplies; and upon the result of the terms made for coal and cannel would depend the price of gas. The motion was seconded by Mr. H. B. Gilmour, and agreed to. Afterwards a resolution was passed, declaring a dividend for the half year of 5 per cent. on the ordinary consolidated stock, and of 3½ per cent. on the 7 per cent. stock.

The Chairman of the Newport (Mon.) Gas Company, Mr. E. J. Phillips, had a very satisfactory statement to lay before the shareholders at their half-yearly meeting yesterday week. He said that, owing to the extension of the district, it would be necessary to expend a sum of about £7000 in new works during the next two years; and the Directors proposed to raise an additional amount of £6000 on the new "C" shares. The revenue showed an increase of £850 compared with 1888. The higher price of coal accounted for an additional expenditure of £900. The increase in the make of gas amounted to nearly 6 million cubic feet. The report was adopted; and dividends of 3½, 3¾, and 5 per cent. were declared for the half year on the various classes of stock.

Contrary to the almost general experience of gas companies, the last reduction in the price of gas that the Directors of the Redhill Gas Company made (which, with the previous remission of half the meter-rents, was equal to 3d. per 1000 cubic feet) has not lead to a more extensive use of gas. A Company has recently been registered says the annual report, for the purpose of supplying gas to Godstone and Bletchingley, which are within the limits of the Company's Act; and the Directors are taking the necessary steps to protect the interests of the shareholders. The accounts show a balance of £3830, which, with £400 transferred from the renewal account and the balance brought forward, makes a total of £4522, out of which a dividend has been declared on the paid-up capital at the rate of 10 per cent. per annum, less income-tax. An interim dividend of 4½ per cent. was paid in September last; leaving 5½ per cent. to be paid on March 1 next.

The annual general meeting of the Uxbridge and Hillingdon Gas Company took place last Tuesday, under the presidency of Mr. W. Fassnidge. The report presented showed a profit of £3084 on the working in the twelve months ending Dec. 31 last; and this added to the surplus brought forward, made a sum of £3092 available for division. The payment of the full dividends absorbs £2597, and would leave a balance of £495, of which the Directors propose to add £250 to the reserve fund account, and carry forward the balance. They therefore recommended the payment of dividends (less income-tax) of 10 per cent. on the original shares, 7½ per cent. on the 1861 shares, and 7 per cent. on the 1873 shares. The Directors have decided to make, as from the 31st prox., a reduction of 3d. per 1000 cubic feet to all consumers who are now paying more than 4s. per 1000 cubic feet. The Chairman, in moving the adoption of the report, furnished some interesting statistics as to the Company's operations in the past two years. As compared with the year ending Dec. 31, 1888, the receipts for gas sold, meter rentals, and residual products during the past year were in excess by the sum of £402 16s. 11d.—£8793 15s. 8d. as against £8390 18s. 9d. The quantity of gas sold and brought to charge in 1888 was 30,971,000 cubic feet; in 1889 it was 32,434,200 cubic feet—showing an increase in the consumption of nearly 1½ millions (actually 1,463,200 cubic feet). Notwithstanding the increased cost of coal—due partly to the rise in price, and partly to the larger quantity used, the gross outlay had been £59 3s. 3d. less, to earn the larger rental; the expenditure for 1888 having been £5666 6s. 11d., and for 1889, £5607 3s. 8d.—the result being that a gross profit of £3186 12s. was obtained in 1889, which was £462 0s. 2d. in excess of the profit in 1888. This very satisfactory result was largely due to careful management and skilful working; all the buildings, machinery, and plant (which are under the supervision of Mr. S. Penny, the Engineer and Manager) being kept in first-rate condition. The report was adopted, and the dividends recommended therein were declared. One of the retiring Directors was Mr. Alfred Penny, C.E., who was re-elected; his great services to the Company, owing to the special knowledge he brought to bear in connection with the business, being particularly referred to by the Chairman. A vote of thanks was accorded to the Chairman, Directors, and Engineer, and the proceedings closed.

The shareholders of the Weymouth Gas Company had their half-yearly meeting on the 13th inst., when the Directors reported that although coal had cost, in the six months ending Dec. 31 last, £319 more than in the corresponding half of 1888, there had been a better return from the sale of gas and residual products, coupled with a decrease in the expenditure; and consequently the balance on the revenue account compared very favourably with that of the previous year. Dividends at the rates of 10 and 7 per cent. per annum, less income-tax, were declared. The Deputy-Chairman (Mr. R. Thomas), who presided, in moving the adoption of the report, referred to the adverse circumstances under which the Company's operations, like those of other gas companies, had been conducted during the past half year. Had it not been for these, he said, the Directors would have been able to point to a time when some further reduction in the price of gas would be made; but now this was impossible. These matters required great attention, especially on the part of their excellent Manager (Mr. James Lowe), who had hitherto been equal to all emergencies, and would exercise in the future the same zeal as he had displayed in the past. The report was adopted. The retiring Directors and Auditor (Mr. W. Livesey) having been re-elected, a vote of thanks was accorded to the Chairman and Directors for their efficient conduct of the Company's business. An interesting incident of the proceedings was the exhibition of the portrait of the late Chairman (Mr. Damon), which has been painted by a local artist and hung in the Board-room. It is in an oak frame, which has upon it a plate bearing an inscription to the effect that Mr. Damon was for 22 years a Director, and for 16 years Deputy-Chairman of the Company. The portrait was considered to be a well-executed work of art, and met the approval of the shareholders.

Water Companies.

The Directors of the Newcastle and Gateshead Water Company, in their annual report, congratulate the shareholders on the favourable balance-sheet they are again enabled to lay before them. The revenue shows the substantial increase of £5356; but on the other hand, there has been a larger expenditure on coals, materials, and wages. The surplus shown by the accounts would have justified the Directors in paying a larger dividend than that proposed; but having regard to these circumstances, and the expenditure to which the Company is committed in the extension of their gravitation works on the river Rede, they have thought it desirable, whilst paying an increased dividend, to carry forward a larger balance than heretofore. After paying all working expenses, interest on debenture stock and loans, and deducting the interim dividend paid in August last, and adding the net

revenue on the year to the balance brought forward, there remains the sum of £42,074, from which the Directors recommend the payment of dividends at the rate of 10 per cent. per annum for the half year on the old ordinary stock, making (with the interim dividend) 8¾ per cent. for the year, and at the rate of 7 per cent. on stock under the Act of 1876, making (with the interim dividend) 6½ per cent. for the year. The report further states that the new reservoir at West Hallington, which has been in progress since 1884, has been completed, and is now available for storeage. During the year the Directors have had to lament the death of Mr. Alderman Plummer, who was for 28 years a Director, and 12 years Chairman of the Company.

In the course of his remarks at the recent annual meeting of the South Hants Water Company, the Chairman (Mr. C. Crew) gave some figures which showed very clearly that the undertaking is making good headway. He said that the net profit for the past year was £2546, against £1854 in 1888; or an increase of £692. The water receipts amounted to £5823, against £5475; the increase being £348. The difference between the £348 and the £692 was made up by economies effected. The capital now stood at £80,885. The district contained a population of about 40,000; so that the capital was only about £2 per head, which was reasonable for works of such a character. The result of this satisfactory progress was that they were able to pay a dividend of 3½ per cent. (¼ per cent. more than last year); 4 per cent. on the debenture stock; and 5 per cent. on the preference stock; in addition to which they had written £350 off the suspense account, which now stood at only £500. As to the future, the Chairman thought there was every promise of increased revenue.

THE PROPOSED PURCHASE OF THE GAS AND WATER WORKS BY THE CANTERBURY CORPORATION.

Unforeseen Difficulties.

Yesterday week, a Special Meeting of the Canterbury Town Council was held for the purpose of dealing further with the Gas and Water Company's Bill and the proposal to acquire their property. At the outset, the Mayor explained that, owing to the non-receipt from the Company of the provisional agreement to purchase the works, the Council could not proceed in the latter matter. He, therefore, proposed that they take the second resolution on the *agenda*, authorizing opposition to the Company's Bill in the absence of a settlement between the Corporation and the Company of terms for purchase. Mr. Cross moved the presentation of a petition against the Bill, and pointed out that powers were sought by the promoters to increase their dividends on a sliding scale. Mr. Dean seconded the proposition; and it was carried. The Town Clerk mentioned that in the event of an agreement to purchase being arrived at, an Act of Parliament would be necessary; and the matter must be brought before a Common Hall.

On the same day a meeting of owners and ratepayers was held, at which sanction was given to the Council to oppose the Bill.

A local contemporary, writing on the subject, says: "The projected acquirement by the Canterbury Town Council of the gas and water undertakings is not working out so smoothly as was anticipated, looking to the unanimity shown by both the city representatives and the Company's Directors in agreeing to a transfer by valuation. Subject to the consent of the shareholders, the course appeared clear for a Provisional Order giving the necessary powers; but further investigation of the Acts bearing on the question has showed to the contrary—it being provided that the total amount to be raised by any Local Authority for purchase or construction of works must not exceed a certain proportion of the rateable value of the borough. As a consequence, the intended procedure by Provisional Order was rendered impossible; and the purchase cannot take place without a Special Act of Parliament, which cannot be obtained until 1891, and then only at great expense. But a still more serious and remarkable discovery was in store. The Committee of the Town Council appointed to consider the matter are of opinion that, in default of immediate purchase, it is absolutely necessary in the interests of the citizens that certain clauses in the Bill now being promoted by the Company for obtaining powers to extend their works and raise their charges, should be opposed before the Parliamentary Committee. Here also the way is absolutely barred under existing circumstances. A majority of the entire Council must vote for the resolution, and no shareholder or director of the Company promoting the Bill to be opposed may take part in the division. It now transpires that one-half of the aldermen and councillors are shareholders in the concern; and such being the case, the required majority is a mathematical impossibility. Thus the Company would appear to hold the trump card, unless some of the city representatives are public-spirited enough to solve the difficulty by selling out their shares." From the above notice of the proceedings at the meeting of the Council, it would appear that the necessary disposal of shares by one of the members has been duly effected.

The Northern Coal Trade.—The demand for coal during the past few days has been made irregular by the dread of a strike in the county of Durham. Some of the coal-owners in that county have declined to sell forward until some settlement is arrived at, and there has been a pressure to get coal shipped, as some of the consumers desired to lay in stock. The miners, however, have been working better; and the supplies of coal are thus more adequate, so that the shipments have been well maintained. The price of gas coal is a little easier—the local demand now showing the usual signs of falling off; but from 13s. to 14s. per ton, free on board, must be taken as the current figure. Bunker coal and household coal are both easier; but the demand for manufacturing coal is still very large, and that for coal for locomotive use is much above the usual at this time of the year. For Northumbrian coal, the demand is well sustained; but the price is a little easier, and best steam coal may be put at about 12s. 9d., free on board. Some of the Northumbrian collieries are booking orders of some moment, so as to secure supplies to users in case there should be a strike in Durham; and as this is the dullest season of the year to Northumberland, these orders are a decided benefit to the coal-owners of the most northern county.

METROPOLIS WATER SUPPLY.

The Quality of the Water during the Month of January.

The returns furnished to the Registrar-General by the London Water Companies on the water supply of the Metropolis during the past month, show that the average daily supply was 161,955,888 gallons, being at the rate of 27·4 gallons per head of the population, as compared with 26·9 gallons in January, 1889. Of the entire bulk of water sent out, 82,666,662 gallons were drawn from the Thames, and 79,289,226 gallons from the Lea and other sources. Reporting upon the quality of the supply, Dr. E. Frankland said: "Taking the average amount of organic impurity contained in a given volume of the Kent Company's water during the nine years ending December, 1876, as unity, the proportional amount contained in an equal volume of water supplied by each of the Metropolitan Water Companies, and by the Tottenham Local Board of Health was: Kent, 0·5; Tottenham, 1·1; Colne Valley, 1·6; New River, 2·7; East London, 3·9; Lambeth, 4·4; Chelsea, 4·5; West Middlesex, 4·6; Southwark, 4·9; and Grand Junction, 5·0. The water drawn from the Thames by the Chelsea, West Middlesex, Southwark, Grand Junction, and Lambeth Companies was much inferior in quality to that delivered at the close of last year. The heavy rains in the early part of the month washed much polluting matter into the river and taxed the filters of the Companies severely. Nevertheless, in every case, the water was delivered clear and efficiently filtered. The water obtained chiefly from the River Lea by the New River and East London Companies was also inferior to that delivered in December, but still superior to the best of the Thames-derived waters. It was also efficiently filtered. The deep-well waters of the Kent and Colne Valley Companies and of the Tottenham Local Board of Health are unaffected by floods, and were of their usual high degree of organic purity; the Kent Company's supply being again especially distinguished in this respect. All these waters were clear and bright."

Messrs. Crookes, Odling, and Tidy, in the course of their report to the Official Water Examiner for the Metropolis (General A. de Courcy Scott) on the quality of the daily samples of water supplied in London during January, say: "During the first month of the new year the quality of the water supplied to the Metropolis has not shown any retrogression, but has continued to be of the same high character (exceptionally high for the period of the year) as recorded in our previous monthly report. Taking the estimations of organic matter present, of oxygen required for its oxidation, and of degree of colour tint, while one item has shown a slight increase, and another a slight decrease, the variation in each case is within very narrow limits. As regards the water furnished by the Companies taking their supply from the Thames, the maximum amount of organic carbon found in any single sample examined was 0·146 part in 100,000 parts of the water, as against a maximum of 0·153 part, and a mean of 0·143 part in the previous month's entire supply."

Sales of Shares.—Messrs. Bishop and Day recently sold by auction, at Swindon, a large number of shares in the *Swindon New Gas Company, Limited*, at very satisfactory prices. The shares are £1 each, fully paid; and they fetched as much as £2 0s. 6d. each.——Yesterday week four £12 10s. "B" shares in the *Rochester, Chatham, and Strood Gas Company* were sold by auction at £20 per share.——Two £5 shares in the *Brompton Water Company* secured £15 12s. 6d. each. Similar shares fetched £15 10s., £15 7s. 6d., and £15 5s. each. Six £5 shares, upon which £3 was to be called up, were knocked down at £10 15s. per share.——At Maidstone, last Thursday, five £10 original 10 per cent. shares in the *Maidstone Water Company* were sold by auction for £107; five £10 ordinary 7 per cent. shares fetching £90.

The Engineering Appointments in the Liverpool Corporation Water Department.—At the meeting of the Water Committee of the Liverpool Corporation yesterday week, Mr. Joseph Parry, in a letter which was read by the Town Clerk, signified his acceptance of the position of Water Engineer to the Corporation on the terms mentioned in the resolution passed by the Council on the previous Wednesday (*ante*, p. 299), and expressed his keen appreciation of the confidence reposed in him. A letter was also read from Mr. G. F. Deacon, acknowledging the receipt of an extract from the Council proceedings relating to his engagement in connection with the Vyrnwy works, to which he assented. He said: "The only important alteration made by the Council in the recommendation of the Committee is the limitation of the duration of my engagement as Consulting Engineer to two years. Respecting this, I desire only to remark that the extent to which I at least contemplated the necessity of giving my services after the end of this year was probably not understood by the Council. My attachment to the undertaking is much greater than money alone can make it; otherwise I could not have consented to perform the work I contemplated for £500 a year."

The "Tipping" System.—At the meeting of Bell's Asbestos Company, Limited, which was held last Thursday, the Chairman (Mr. J. Bell), in moving the adoption of the report, referred to the practice of the Company in giving "tips" in order to secure business—a matter which was commented upon in our editorial columns a fortnight ago, when certain criminal proceedings brought the affairs of this undertaking into considerable prominence. The Chairman stated that the Auditors had certified to the correctness of the balance-sheet, "subject to the non-production of vouchers for gratuitous payments." These, he explained, were the gratuities allowed to the *employés* of their customers, whose services the Company desired to enlist in order that future orders might be obtained. Presents of money and other things were made to them at Christmas and other seasons; and a complete record was kept in their books of how the money was spent. He added that the Directors would take the adoption of the report that day as a mandate to them to continue the conduct of the affairs of the Company on the lines already pursued. In the course of the subsequent discussion, the system of giving money or making other presents to servants of customers was strongly deprecated; and an amendment disapproving the practice was proposed. On being put to the vote, it was, however, lost.

NOTES FROM SCOTLAND.

From our Edinburgh Correspondent.

EDINBURGH, *Saturday*.

The return which was agreed to be obtained by the Dundee Gas Commissioners at their last meeting, relative to the consumption of gas in the gas-works, has been made up and furnished to the members of the Commission. For the past four years the figures are: 1885-6, 4,726,200 cubic feet; 1886-7, 4,959,600 cubic feet; 1887-8, 4,955,300 cubic feet; and 1888-9, 5,747,700 cubic feet. There is thus an increase of about a million cubic feet last year over the other years; and this arises mostly in connection with the east retort-house, where the consumption last year was 2,641,000 cubic feet. Of 27 places tabulated, 19 show a less consumption last year than in some of the preceding years, and eight show an increased consumption. There is no doubt that in the case of the works' departments there are satisfactory reasons for the increases which some of them show, and it may be the same with regard to the others; but it is at least significant that in all the dwelling-houses which are supplied, with the exception of one which is now abolished, there has been a progressive increase. The Manager's house is specially conspicuous in this respect. With gas at 3s. 6d. per 1000 cubic feet, the charge for that house alone is over £31. I say nothing of the Manager's house, because he is in a position where a large consumption might be expected; but in the case of the workmen, the charges are certainly higher than what they would pay were it at their own cost. I know that in Edinburgh, with gas at 3s. 4d. per 1000 cubic feet, a workman's house with two burners can be lighted for 25s. a year; so that the Dundee officials consume about four times as much as a working man in Edinburgh. This should make the Commissioners consider whether it is advisable to provide their employees with free gas. I should think it extremely likely that the charges are augmented by the use of gas-fires; and if that be so, the Commissioners will take into account whether it is cheaper to furnish gas or coals to them. If there are no gas-fires, there is evidently a field for economy in the department I have selected for illustration; and if other departments are in any degree similarly situated, the Commissioners may profit by the return which ex-Provost Brownlee was instrumental in procuring. The total value of gas consumed is £1000 a year—certainly not a great deal upon the revenue of £73,000. It is not sufficient to affect the price of gas in any one year; but a few hundreds saved every year would be a desirable addition to the reserve or other funds.

Lord Wellwood, in the Court of Session last Tuesday, closed the record in an action in which Mr. W. A. Drummond, 166, Perth Road, Dundee, formerly a flax spinner, sues Messrs. T. Fletcher and Co., gas engineers, Warrington, for £5000 as damages for the alleged infringement of a patent which the pursuer holds for improvements upon the boilers of steam-engines. He also asks for interdict. His patent is dated March and July, 1886; and consists of increasing the heating surface by studding it with projections. He avers that the defenders have been making and selling gas fires and stoves which embody his invention; and he wishes to put a stop to their doing so. In reply, they say that, as the result of many years' scientific research, they manufacture a variety of articles for heating by gas; and they maintain that the invention of the pursuer has been known and in common use for at least a century. They instance the three-legged iron pot, which boiled sooner on account of the projections on its bottom, and the experience of the Peninsular and Oriental Company in their steamer *Pacha*, in the boilers of which the same arrangement, they say, was used at least nine years prior to the date of the letters patent. They also contend that for many years the invention has been in common use in steam-boilers, sugar-pans, and other evaporative vessels. The case was sent to proof.

A meeting of the Scottish Electric Supply Company was called in Edinburgh on Thursday to consider as to further procedure in connection with their application to the Board of Trade for a Provisional Order for the electric lighting of Edinburgh. After a statement had been made by the Chairman, it was unanimously resolved to authorize the Directors to lodge answers to the objections which had been intimated to the Company's application for an Order by the Corporation of Edinburgh, the Gas Commissioners, and the Water Trustees; to remit the matter to the Directors with discretionary powers, including power to memorialize the Board of Trade praying for a local inquiry; and to empower the Directors to make such further calls as may be necessary or expedient.

From our Glasgow Correspondent.

GLASGOW, *Saturday*.

Referring to a "Note" sent a fortnight ago bearing on the great consumption of gas in Glasgow and suburbs on Feb. 6, which was an exceedingly dark, foggy day, I may now state that so far as the month has gone, there has been a very large daily consumption of gas. I have already stated that on the day mentioned it was 15,921,000 cubic feet, or 4,021,000 feet in excess of the consumption on the corresponding day of last year. On each of a number of days since it has amounted to fully 2 million feet more than on the corresponding days of 1889; and in some other cases it has been between 1 and 2 million feet increase. On the 7th inst. and other three days the deliveries ranged between 13,814,000 feet and 13,106,000 feet; and in no case have they been under 11,640,000 feet. Whereas over the same period of last year the maximum daily consumption was 12,192,000 feet, while the minimum consumption in any 24-hour period was not more than 10,206,000 feet. The total deliveries for February are expected to show a very large increase.

At the last monthly meeting of the Clydebank Police Commissioners, it was resolved to petition against the Bill that is being promoted in Parliament by the Partick, Hillhead, and Maryhill Gas Company, on the ground, as they allege, that the terms of the Bill show that the Company are seeking power to cut off the present supply which is obtained from the Glasgow Corporation Gas Commissioners at 2s. 6d. per 1000 cubic feet, and substitute their gas at a dearer rate. It was also resolved that, as co-petitioners against the Bill with the ratepayers of Kelvinside and others, the Burgh of Clydebank should subscribe sixty guineas towards the expenses of the opposition.

The personal and professional friends of Mr. David Terrace are expressing much regret at the early removal of that gentleman from amongst them, in order to enter upon the duties of his new appointment of Gas Manager to the Corporation of Middlesbrough. He has been, I think, for somewhere about ten years Manager at the Corporation Gas-Works, Dawsholm, where he has rendered faithful and excellent service to his present employers, the Glasgow Gas Commissioners. He will certainly be very much missed when he goes across the Border, so far as Scotch gas managers are concerned; but he will, at the same time, become a decided acquisition to the gas profession in the North of England. So far as I can learn, nothing has yet been done in the way of providing a successor for the position which he is about to vacate; but it is not unlikely that the resignation will be formally reported to the Corporation Gas Committee at their ordinary monthly meeting next week, and that it will be resolved there and then to advertise for applicants for the appointment.

Last Sunday, shortly before midnight, a fire was discovered to have broken out in the engine-room of the Kilmarnock Gas-Works; and only after some three hours' vigorous labour on the part of the fire brigade was it totally extinguished. Comparatively little damage was done to the engines except by the water. The fire was caused by an escape of gas from the regulator, which became ignited at a gas jet, and an explosion took place. Fortunately the two doors of the room and one of the windows were open at the time, in consequence of which the force of the explosion was considerably modified. As soon as the fire was extinguished, the men set to work to get the engines and exhauster in order; but it was not till next midnight that this could be accomplished. The fire for a time looked alarming; but there was really no danger to anyone, or fear of the gas supply being cut off. On Monday night another accident occurred—this time in the chemical works connected with the gas-works; and it was entirely the result of Sunday night's gas escape and explosion and fire. The purifiers had got a little hard to work; and as there was a stoppage of the exhausters on Sunday night a heavy back pressure resulted to the seal on the tar-pipe. Gas was thus allowed to escape into the tar tank and elsewhere; and eventually another explosion took place. Even the two explosions together did not result in much damage; and what did occur was quite covered by insurance.

There has been no change of any consequence during the past week in the local market for sulphate of ammonia. An undertone of firmness still prevails, and makers refuse to reduce their ideas as to values. They are asking £11 17s. 6d. per ton, and several bids at 1s. 3d. per ton lower have been refused. A slight improvement is noticeable in respect of the extent of the inquiry for stuff; but little business is resulting, either for prompt or forward delivery.

The pig-iron warrant market opened strong on Monday; and for Scotch warrants up to 54s. 10½d. per ton cash was reached on Wednesday. But from that point prices rapidly fell away; the closing price yesterday afternoon being down at 52s. 8d. per ton cash buyers.

The local coal trade remains very steady. The masters have still a worry with their men, who are inclined to stop work for a day so that they may get an advance. The cold weather is stimulating the demand for house descriptions; but the masters have anticipated this contingency. Dross is in active request; and 6s. 6d. has been paid at the pits for the better class. Steam coal is sent in large quantities to the public works, and values remain firm. Main coal is moving off freely. Quotations, f.o.b., are as follows:—Splint, 10s. 9d. to 11s. 3d.; steam, 11s. to 11s. 6d.; main, 9s. 9d. to 10s.; and ell, 10s. 6d. to 10s. 9d.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Feb.* 22.

Sulphate of Ammonia.—The market has been comparatively quiet during this week. Prices have nevertheless remained very steady. F.o.b. Hull business has been done at £11 17s. 6d. to £11 18s. 9d.; f.o.b. Leith, at £11 16s. 3d.; and f.o.b. Liverpool, at £11 15s. to £11 16s. 3d. Some "Bear" sales are reported for March delivery at much lower prices; the operators endeavouring to cloak their doings by placing quotations at full prices before makers. It is improbable that, in spite of these operations, prices will give way, because large quantities have to be covered in, both by consumers and speculators; and there is not much sulphate on the market—the decreasing production preventing accumulations. Nitrate has become rather weak, on account of the failure of a positive agreement among producers so far; the last meeting held at Iquique having separated without confirming the basis of an arrangement to restrict production.

LONDON, *Feb.* 22.

Tar Products.—A little more life has been infused into this market during the week; and although prices are no better—indeed, in one or two instances, they are lower—some important contracts have been made. Benzols are a penny and twopence per gallon lower respectively; whilst ordinary creosote, pitch, and carbolic acid "hang fire" at prices quoted below. Anthracene is said not to be so strong; but no business has been reported. The balance-sheets of one or two tar concerns for the past year are nothing like so rosy as had been expected. Prices: Tar, 25s. to 31s. 6d. per ton, according to position. Benzol, 90 per cent., 3s. 10d. per gallon; 50 per cent., 3s. Toluol, 1s. 11d. per gallon. Solvent naphtha, 1s. 8d. per gallon. Crude naphtha, 1s. 2½d. per gallon. Light oil, 4½d. per gallon. Lucigen creosote, 3d. per gallon. Ordinary creosote, 2½d. per gallon. Carbolic acid, 2s. 10d. per gallon. Anthracene (30 per cent.), "A" quality, 1s. 6d. per unit; "B" quality, 1s. 3d.

Sulphate of Ammonia.—There has been a steady market during the week, and large transactions have taken place, at prices ranging from £11 15s. to £11 17s. 6d., according to position. Unfortunately, this market is still in the hands of depressing operators. The lower prices of nitrate soda materially help the latter in their efforts to reduce prices. There is likely to be a large demand for the home market this spring; and higher prices may be expected.

Wakefield Corporation Water-Works.—At the last meeting of the Wakefield City Council, the City Surveyor (Mr. R. Porter) was appointed Engineer of the completed water-works, at an additional salary of £50 per annum. Some of the members were of opinion that a thoroughly qualified water engineer should be engaged.

The Bolton Corporation Coal Contracts.—A Sub-Committee has been appointed to investigate the charge, referred to last week, that the Bolton Corporation Gas Department have lost £3000 annually on the coal contracts, owing to "screening" not being insisted upon. The Sub-Committee held a meeting last Friday, but did not come to any definite conclusion. The inquiry is being pursued.

The Wigan Corporation Gas Department.—At a meeting of the Gas Committee of the Wigan Corporation last Wednesday, the Borough Treasurer was instructed to prepare a list of the clerks in the Gas Department, their salaries and duties; and a Sub-Committee was appointed to report thereon to the next meeting of the Committee. The demand of the lamplighters for an increase of wages and additions to the staff was considered; and it was resolved that the wages remain as at present, with the appointment of one extra lamplighter. Applications from the gas-fitters and main-layers for an advance of wages by 10 per cent., were also under consideration. It was resolved that the wages of the former should stand, but that those of the latter should be increased from 5¾d. to 5¾d., and from 5¾d. to 6d. per hour.

The Gas Supply of Philadelphia.—According to the report of the Gas Bureau of Philadelphia, the receipts for the past year were $3,658,224; and the expenditure, $2,851,019, leaving a cash profit of $807,205. The expenditure included $292,156 for extensions, so that the real profit from the works was $1,099,361. The receipts of the preceding year were $3,870,383; and the expenditure $3,321,962. There was a considerable falling off in the receipts for coke, tar, &c., as compared with 1888, owing, it was stated, to the introduction of water gas. The following are some comparative figures relating to the expenditure for the past two years:—1888: Works, $128,568; mains, $163,576; services, $91,059; gas, $2,120,011; repairs, $273,088; public lighting, $157,809; miscellaneous, $386,848. 1889: Works, $276,386; mains, $140,848; services, $96,779; gas, $1,654,772; repairs, $273,689; public lighting, $82,304; miscellaneous, $326,238. In addition to the gas sold, about 650 million cubic feet were manufactured and used without cost to the city; and if this were paid for at the rate of $1.50 per 1000 feet, the receipts—$975,000—would bring the total profit of the works up to $2,074,351.

Divining for Water.—The divining-rod as a means of finding a good supply of water stood a very successful trial last week at Oundle, in Northamptonshire. Mr. W. Todd, a landowner, requiring a well on a portion of his property, sent for a "diviner"—a man named Pearson. There has been lately some difficulty in obtaining a supply of water in the town; and the Oundle Commissioners have, we believe, spent £83 in trial borings. Although the trials were conducted by a professional man, they proved futile. In the presence of a number of spectators drawn together by the novelty of the experiments, Mr. Pearson, with the usual V-shaped hazel twig, walked over the estate. In several places the twig was visibly agitated; but the "diviner" kept on until the twig almost bent itself double in his hands. At this spot he indicated with confidence that a good supply of water would be found. A well was accordingly sunk, with the result that, at a depth of 17 feet, water was found in such abundance that it rapidly rose to within 3 feet of the surface, at which height it has since remained. It is stated that during the making of the well the water percolated into it so rapidly, that operations had to be suspended at frequent intervals to pump it out.

Destruction of Messrs. Forbes, Abbott, and Lennard's Chemical Works by Fire.—Early last Sunday morning, a fire was discovered in one of the buildings at Ordnance Wharf, Greenwich, belonging to Messrs. Forbes. Abbott, and Lennard, chemical manufacturers. Very soon after the discovery was made the entire structure was enveloped in fire from top to bottom and from end to end; and the flames bursting through the windows set light to the large quantities of creosote, &c., contained in barrels lying about in the open ground all round. So rapid was the spread of the conflagration, notwithstanding all efforts to subdue it, that it became obvious that the whole manufactory must be destroyed; and it was not long after the first outbreak that the laboratory, offices, and dwelling had all become involved, and began to burn with great fierceness. The fire attacked the next wharf, and ignited some of the barges lying alongside. The firemen, however, eventually succeeded in preventing the flames spreading, and in this way saved some thousands of barrels of oil from destruction. The extent of the conflagration may be estimated from the fact that it was not until late on Sunday that some of the engines were able to leave the scene. The cause of the fire is unknown, as all the workmen had left the premises some hours before it was discovered. Two buildings—one of one and two floors, about 165 feet by 110 feet (used as manufactory and store), the other of three floors, about 40 feet by 30 feet, used as laboratory, offices, and dwellings—were destroyed, the contents burnt out, and the roofs off. About 1000 casks of creosote and 300 carboys of sulphuric acid were also destroyed, and the stills damaged by fire. The contents of the buildings were not insured.

Water-Works for Mid-Kent.—The new water-works which are in course of construction for the supply of West Malling and several villages on the west banks of the Medway, between Maidstone and Rochester, are fast approaching completion. The well, which was commenced in July last at Lower Halling, near Rochester, was dug to chalk-water level, 50 feet from the surface, then bored for 315 feet, making a total of 365 feet, at which depth, on the 17th inst., water was tapped in the lower greensand. The geological formations passed through were, for the first 40 feet chalk, then a thin layer of rock, through 220 feet of gault, and 20 inches of very hard rock into the greensand, which is of a coarse nature. The yield is abundant, as immediately on being tapped it rose to within 37 feet of the surface, or 13 feet above chalk-water level, and is estimated to stand at a constant level, pumping over 20,000 gallons per hour. The bore-hole is lined with 15-inch wrought-iron tubes screwed together in wrought-iron sockets with a steel shoe, and then perforated tubes with 5290 holes ½ inch in diameter, in order to keep the sand from rising. The reservoir, to hold about 200,000 gallons, is built, and only has the roof to be put on; and some eight miles of mains are laid. There are several large works, besides a population of about 8000 to be supplied; and at the request of the West Malling Rural Sanitary Authority, the Mid-Kent Water Company are applying, as stated in the JOURNAL last week, for a Provisional Order to enable them to extend their area, especially on the east bank of the River Medway. Mr. R. Batchelor, of Chatham, who has successfully made six out of the ten borings into the greensand in the county of Kent, was the contractor. Messrs. W. Russ and A. Bowker are the Engineers for the scheme.

The Salford Town Council and the Hunter Bribes.—In last week's JOURNAL, we announced that requisitions had been presented to the Mayor of Salford, asking him to call a special meeting of the Council relative to the gas frauds. Instead of complying with this request, he convened a conference of the members of the Consultative Committee and the requisitionists for last Friday, when the Town Clerk stated that, if the Mayor were to accede to the prayer of the petition, the result would probably be to prejudice the pending action against Mr. Ellis Lever. In reply, the requisitionists pointed out that the resolutions proposed to be considered at the special meeting would not in any way interfere with the pending action; and therefore they could see no reason why the meetings should not be held. The Mayor, however, acting on the advice of the Town Clerk, and supported by Mr. Alderman Dickins, definitely declined to call the meeting. Thereupon the requisitionists, in accordance with the Municipal Corporations Act, 1882, of themselves convened a special meeting of the Council, to be held to-morrow; and the usual notices have been issued by the Town Clerk. These state that the resolutions to be considered are: "(1) That the Consultative Committee be, and it is hereby directed to continue legal proceedings against all persons alleged to be implicated in the frauds in connection with the Corporation gas-works, and that any former resolution or resolutions of the Council inconsistent with this instruction, be and the same is or are hereby rescinded. (2) That in the opinion of this Council, the release of claims against persons alleged to be implicated in the frauds in connection with the Corporation gas-works, unaccompanied by a proper judicial or independent official investigation of such frauds, would be inconsistent with the true interests of the Corporation and contrary to public morality. This Council therefore supports the prayer of the petition to Parliament (now being promoted) asking that a Commission may be appointed to inquire into the said frauds."

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

For Stock Market Intelligence, see ante, p. 339.

Issue.	Share	When ex-Dividend.	Dividend on last Div. & Bonus.	NAME.	Paid per Share.	Closing Prices.	Rise or Fall in Wk.	Yield upon investment.
£			p. c.	GAS COMPANIES.				£ s. d.
590,000	10	16 Oct.	10½	Alliance & Dublin 10 p. c.	10	17½—18½	..	5 13 6
100,000	10	,,	7½	Do. 7 p. c.	10	12½—13½	..	5 11 1
300,000	100	2 Jan.	5	Australian (Sydney) 5 % Deb.	100	108—110	..	4 10 11
100,000	20	28 Nov.	8	Bahia, Limited	20	19½—20½	..	7 16 1
200,000	5	14 Nov.	7½	Bombay, Limited	5	6—6¼	..	5 15 4
40,000	5	,,	7½	Do. New	4	4⅝—5⅛	..	5 17 10
380,000	Stck.	14 Aug.	12½	Brentford Consolidated	100	218—223	..	5 9 10
125,000	,,	,,	9½	Do. New	100	160—164	..	5 12 10
220,000	20	12 Sept.	11	Brighton & Hove, Original	20	41—43	..	5 2 4
320,000	20	27 Sept.	11½	British	20	43—45	..	5 0 0
50,000	10	12 Sept.	11	Bromley, Ordinary 10 p. c.	10	19—21	..	5 4 9
39,000	10	,,	8	Do. 7 p. c.	10	13—15	..	5 6 8
328,750	10	14 Nov.	10	Buenos Ayres (New) Limited	10	13—14	..	7 2 10
200,000	100	2 Jan.	6	Do. 6 p. c. Deb.	100	105—108	..	5 11 1
150,000	20	14 Aug.	8	Cagliari, Limited	20	25—27	..	5 18 4
550,000	Stck.	16 Oct.	13½	Commercial, Old Stock	100	245—250	..	5 10 0
130,000	,,	,,	10½	Do. New do.	100	195—200	..	5 7 6
130,000	,,	30 Dec.	4½	Do. 4½ p. c. Deb. do.	100	118—123	..	3 13 2
557,320	20	12 Dec.	13	Continental Union, Limited	20	46—47	..	5 10 8
242,680	20	,,	13	Do. New '69 & '72	14	31—33	−1	5 10 4
200,000	20	,,	10	Do. 7 p. c. Pref.	20	37—39	..	5 2 6
75,000	Stck.	27 Sept.	10	Crystal Palace District	100	200—205	..	4 17 7
234,060	10	30 Jan.	13	European, Limited	10	23—25	..	5 4 0
120,000	10	,,	13	Do. New	7½	17½—18½	..	5 5 3
354,060	10	,,	13	Do. do.	5	11⅝—12⅝	..	5 4 0
5,470,620	Stck.	13 Feb.	13½	Gaslight & Coke, A, Ordinary	100	242—247*	+2	5 11 4
100,000	,,	,,	4	Do. B, 4 p. c. max.	100	100—103*	..	3 17 8
665,000	,,	,,	10	Do. C, D, & E, 10 p.c. Pf.	100	250—255*	..	3 18 5
30,000	,,	,,	5	Do. F, 5 p. c. Prf.	100	121—125*	..	4 0 0
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	100	180—185*	..	4 1 1
1,300,000	,,	,,	7	Do. H, 7 p. c. max.	100	157—162*	..	4 6 5
463,000	,,	,,	10	Do. J, 10 p. c. Prf.	100	247—252*	..	3 19 4
1,061,150	,,	12 Dec.	4	Do. 4 p. c. Deb. Stk.	100	114—117	..	3 8 5
294,850	,,	,,	4½	Do. 4½ p. c. do.	100	122—127	..	3 10 10
650,000	,,	,,	6	Do. 6 p. c. do.	100	160—170	..	3 10 7
3,800,000	Stck.	14 Nov.	12	Imperial Continental	100	213—218	..	5 10 1
75,000	5	12 Dec.	6	Malta & Mediterranean, Ltd.	5	5—5⅜	..	5 9 1
560,000	100	1 Oct.	5	Met. of Melbourne, 5 p. c. Deb.	100	113—115	..	4 6 11
541,920	20	28 Nov.	6	Monte Video, Limited	20	18½—19½	..	6 3 1
150,000	5	28 Nov.	10	Oriental, Limited	5	8½—9	..	5 11 1
60,000	5	27 Sept.	7	Ottoman, Limited	5	5⅛—6⅛	..	5 12 0
166,870	10	26 July	4	Pará Limited	10	3⅜—4⅜	..	8 17 9
420,000	100	2 Nov.	6	People's Gas of Chicago—1st Mtg. Bds.	100	100—105	..	5 14 3
500,000	100	2 Dec.	6	2nd Do.	100	95—100	..	6 0 0
100,000	10	16 Oct.	10	San Paulo, Limited	10	14½—15½	..	6 9 2
500,000	Stck.	29 Aug.	13½†	South Metropolitan, A Stock	100	280—290	−5	4 11 4
1,350,000	,,	,,	11½†	Do. B do.	100	220—230	..	5 0 0
141,500	,,	,,	12†	Do. C do.	100	235—245	..	4 17 11
650,000	,,	30 Dec.	5	Do. 5 p. c. Deb. Stk.	100	137—142	..	3 10 5
60,000	5	12 Sept.	11½	Tottenham & Edm'nton, Orig.	5	11—13	..	4 8 5
				WATER COMPANIES.				
728,446	Stck.	30 Dec.	9½	Chelsea, Ordinary	100	260—265	..	3 11 8
1,720,560	Stck.	16 Oct.	7½	East London, Ordinary	100	211—215	..	3 9 9
544,440	,,	30 Dec.	4½	Do. 4½ p. c. Deb. Stk.	100	143—148	..	3 0 10
700,000	50	12 Dec.	9	Grand Junction	50	122—127	..	3 10 10
708,000	Stck.	13 Feb.	10½	Kent	100	271-276*	..	3 16 0
1,043,800	100	30 Dec.	9½	Lambeth, 10 p. c. max.	100	250—256	..	3 14 2
406,200	100	,,	7½	Do. 7½ p. c. max.	100	197—202	..	3 14 3
200,000	Stck.	27 Sept.	4	Do. 4 p. c. Deb. Stk.	100	124—128	..	3 2 6
500,000	100	13 Feb.	12½	New River, New Shares	100	360—365*	..	3 6 5
1,000,000	Stck.	30 Jan.	4	Do. 4 p. c. Deb. Stk	100	127—130	..	3 1 6
902,300	Stck.	12 Dec.	6	S'thwk & V'xhall, 10 p. c. max.	100	164—169	−1	3 11 6
126,500	100	,,	6	Do. 7½ p. c. do.	100	163—168	..	3 11 5
1,155,066	Stck.	12 Dec.	10	West Middlesex	100	260—265	..	3 15 0

*Ex div.

† Next dividend will be at this rate.

GWYNNE & CO., ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON, W.C.

GWYNNE & BEALE'S PATENT GAS EXHAUSTERS & ENGINES.

Telegrams: "GWYNNEGRAM, LONDON." Telephone No. 2698.

Exhausters of nearly all sizes in Stock.

Prize Medals at all the Great International Exhibitions.

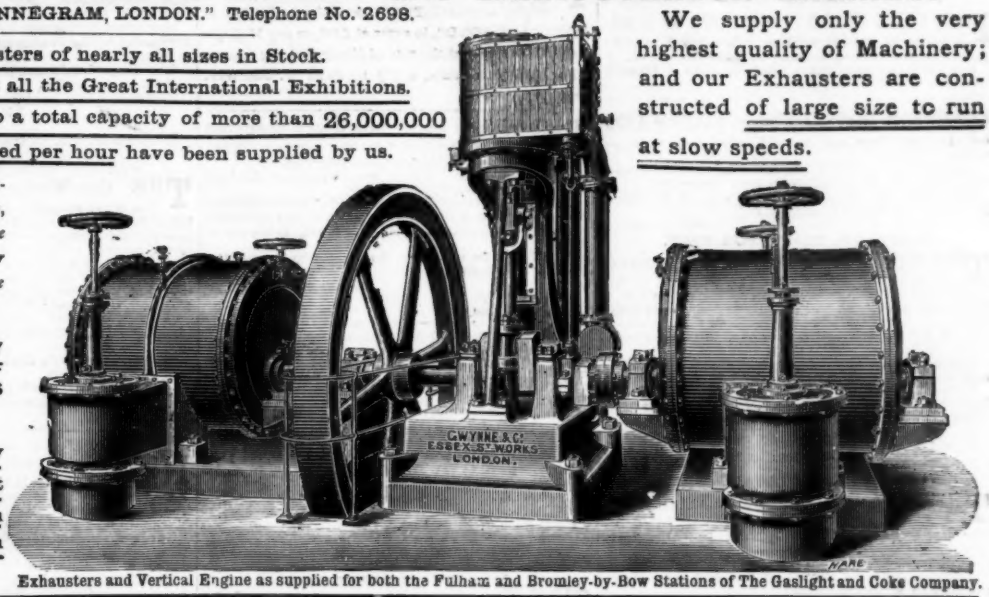
Exhausters equal to a total capacity of more than 26,000,000 cubic feet passed per hour have been supplied by us.

Our new Patent Non-Fluctuating Exhausters, to work without the slightest oscillation or variation in pressure, are strongly recommended.

MAKERS OF EVERY DESCRIPTION OF HYDRAULIC AND GAS MACHINERY.

Gwynne & Co.'s New Catalogue and List of Testimonials can now be obtained on application.

We supply only the very highest quality of Machinery; and our Exhausters are constructed of large size to run at slow speeds.



Exhausters and Vertical Engine as supplied for both the Fulham and Bromley-by-Bow Stations of The Gaslight and Coke Company.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAYS.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale in the United Kingdom than all other Oxides combined. Purity and uniformity of quality guaranteed. Pamphlet, "How to Purchase Bog Ore," to be obtained on application.
Gas Purification and Chemical Company, Limited, Palmerston Buildings, Old Broad Street, London, E.C.
JOHN WM. O'NEILL, Managing Director.

ANDREW STEPHENSON, Agent for the GAS PURIFICATION AND CHEMICAL COMPANY, Limited, Palmerston Buildings, Old Broad Street, LONDON, E.C.

CANNEL COAL, ETC.

JOHN ROMANS & SON, EDINBURGH.
Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS AND WATER WORKS.
Prices, &c., will be forwarded on application to No. 30, ST. ANDREW SQUARE, EDINBURGH, / No. 54, BERNARD STREET, LEITH, } SCOTLAND.

TAR and Liquor wanted.
BROTHERTON AND Co., Commercial Buildings, LEEDS.

TO PROVINCIAL GAS AND WATER MANAGERS.

A BONUS OF £20 will be given to any Gas or Water Manager who can introduce a suitable Business (Grocery or Provisions preferred) to the Advertiser, who has Money to invest in a really first-class Concern.
This Advertisement is inserted in the JOURNAL as Gas and Water Managers or their Collectors are likely to hear of such Businesses being for disposal without their being publicly offered.
Address (in confidence) No. 1788, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

DRAUGHTSMAN wants a Situation in Gas-Works. Will assist in other work if necessary. Good testimonials and references.
Apply, by letter only, to No. 1792, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO GAS ENGINEERS, CHEMISTS, AND OTHERS.

TRAVELLER, shortly disengaged, will be glad to receive OFFERS. Please state Salary and Commission, or Commission only. Offices, Liverpool and Manchester. Good connection.
Address No. 1796, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by a young Man, aged 21, a Situation as GAS-FITTER and STOVE and METER FIXER. Has had good insight into Smith's work in general. Good references.
Address No. 1794, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, an appointment as Manager of a Gas-Works; make 20 to 50 millions. Age 33 years. Thoroughly competent. Understands Manufacture of Sulphate. Highest references.
Apply, by letter only, to No. 1793, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TIMMIS & CO., of STOURBRIDGE,
Make only the best quality of FIRE-CLAY RETORTS, BRICKS, TILES, & LUMPS. Also SPECIAL SILICA BRICKS, to stand great heats.
All descriptions kept in Stock.
For Prices apply to JAMES LAWRIE AND Co, 1, Whittington Avenue, Leadenhall Street, E.C., Sole Agents for London and District.
Telegraphic Address: "EIRWAL, LONDON."

W. C. HOLMES & Co., Huddersfield,
AND 80, CANNON STREET, LONDON,
Contractors for Gas-Works complete, Makers of Gasholders, Purifiers, Scrubbers, Condensers, Retort Fittings, &c., Improved Valves, Engines, and Exhausters. Also for Collingwood's Regenerative Retort-Settings.
*** See Advertisement p. 310 of last week's issue.
Cablegrams: "Ignitor London." Telegrams: "Holmes Huddersfield."

J. & J. BRADDOCK, Globe Meter Works, Oldham.
First-Class Award, Melbourne Exhibition, 1889, for Wet and Dry Gas-Meters, Station Meters, and Governors, Pressure-Gauges, Street Lamps, and Pillars, &c.
Telegraphic Address: "Braddock, Oldham."

A STUDENT of the Institution of Civil Engineers desires SITUATION; home or abroad. Used to the Manufacture of Sulphate of Ammonia. Has passed "Honours" Examination in the City and Guilds of London Institute. Excellent testimonials.
Apply, by letter, to No. 1795, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Man thoroughly acquainted with the Manufacture of GAS-BURNERS.
Apply, by letter, stating experience and wages expected, to No. 1789, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

BOROUGH OF DEWSBURY.

APPOINTMENT OF GAS MANAGER.

THE Corporation of Dewsbury require the services of a thoroughly competent GAS MANAGER, who will be required to devote the whole of his time to the duties of his Office.
Applicants must have had practical experience in the Manufacture of Gas, Sulphate of Ammonia, and other Gas Residual Products, and the Management of large Gas-Works.
Preference will be given to one who has a knowledge of Electric Lighting.
Candidates must also be able to superintend and direct the Distribution of Gas, and the laying down of Mains, Pipes, and other Apparatus in connection therewith.
The salary will be £250 per annum, with House (at the Gas-Works), Coal, and Gas free.
Applications, endorsed "Gas Manager," stating age, qualifications, and experience, together with not more than three testimonials of recent date, as to character and ability, to be sent to me on or before Monday, the 3rd day of March, 1890.
Canvassing is prohibited, and will disqualify a candidate.

By order,
E. MAWDESLEY, Town Clerk.

Town Clerk's Office, Dewsbury,
Feb. 20, 1890.

IRISH BOG ORE OXIDE OF IRON.

GAS PURIFICATION.

BALE, BAKER, & CO., direct Importers from Ireland. Sample and Price on application. Spent Oxide and Sulphate of Ammonia purchased.
120 and 121, NEWGATE STREET, LONDON, E.C.

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Chemical Works, LEEDS, specially produce this ACID for making SULPHATE OF AMMONIA of high quality and colour. *Delivery in Railway Tank-Wagons or Carboys.*
Highest References and all particulars supplied on application.

HUTCHINSON BROTHERS, Barnsley,
Gas Engineers and Contractors, Makers of Wet and Dry Gas-Meters and General Gas Apparatus, Sulphate of Ammonia Plant, Lead Saturators, Tanks, &c., Tools and Sundries.

COZE'S Automatic Apparatus for CHARGING AND DISCHARGING GAS-RETORTS. For Illustrated Advertisement of this System, see p. 306.
Inquiries should be addressed to THE COZE SYNDICATE, LIMITED, 70, OXFORD STREET, W.

GLASGOW CORPORATION GAS-WORKS.

THE Glasgow Corporation Gas Com- missioners require a MANAGER for one of their Manufacturing Stations.
Applicants must be competent to take charge of the Works.
Preference will be given to those who have had experience in managing large bodies of men.
Total emoluments hitherto about £500 per annum.
Sealed applications, endorsed "Manager," containing not more than three testimonials of recent date, and addressed to the Subscriber, will be received not later than Tuesday, the 11th of March.
Canvassing any Member of the Corporation will disqualify the Applicant.

J. D. MARWICK, Town Clerk.

City Chambers, George Square,
Glasgow, Feb. 21, 1890.

FOR SALE—One 8-horse power Engine and COAL BREAKER, with top and bottom Elevator, Gear, and Patent Wrought-Iron Chain, with Malleable Iron Buckets complete.
The above Machinery is almost new, having only been in use about Three months.
For further particulars, apply to the COAL DISTILLATION COMPANY—COOPER'S PATENTS—LIMITED, 322 and 323, Winchester House, Old Broad Street, LONDON, E.C.

STENCIL PLATES.

TO ENGINEERS AND ALL WHO DRAW PLANS.

TO BE SOLD, a magnificently executed Set for LETTERING PLANS, &c. The Set consists of TEN COMPLETE SETS of ALPHABETS, plain, shaded, and ornamental; FOUR SETS of FIGURES in various Styles; and FIFTY PLATES of all the principal words used upon Engineering Drawings, including Scales, Points, Corners, &c., in mahogany case, with Brushes. Price for the whole 30s.
Apply to Mr. G. BAKER, 22, Orpingley Road Hornsey Road, LONDON, N.

FOR SALE—One Single Gasholder, 80 feet by 20 feet (owing to extensions at Blackpool). To be erected complete; in first-rate condition.
Apply to CLAYTON, SON, AND CO., LIMITED, Hunslet, LEEDS.

FOR SALE—A 7-inch Governor by Braddock. In perfect working order; equal to new; in use Six years. Will be ready in about Six weeks.
For price and particulars, apply to JOHN A HARRIS, Manager, Gas-Works, WIGSTON.

STATION Meter by Sugg, passing 4000 feet per hour, will be sold cheap, as it must be removed at once.
Also GAS-PRESSURE REGISTER (new), by W. and B. Cowan, with 800 Tell-Tale Papers. Price £8.
Apply, by letter only, to No. 1791, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

PURIFYING PLANT FOR SALE.

THE Lymm Local Board are prepared to receive TENDERS for the purchase of the PURIFYING PLANT—consisting of Four Purifiers, 5 feet square each, with 6-inch Connections and Hydraulic Centre-Valve (suitable for Works making about 6 million feet)—which is being replaced by larger Plant.
The whole Plant will be put free on Boat.
Full particulars may be had on application to Mr. A. Graham, Gas Manager, Lymm.
Sealed Tenders to be sent to the undersigned not later than Friday, Feb. 28, 1890, endorsed "Purifiers."
The highest or any tender not necessarily accepted.
W. MULLARD, Clerk to the Board.
Lymm, Feb. 11, 1890.

COCKERMOUTH LOCAL BOARD.

THE Gas Committee invite Tenders for the surplus TAR and AMMONIACAL LIQUOR, produced at their Works during Twelve months, commencing the 1st of April next.
Further particulars on application to the undersigned.
Tenders, endorsed "Tar and Liquor," to be sent in not later th n the 12th of March, 1890.
E. W. SMITH, Manager.

THE Ystrad Gas and Water Company invite TENDERS for the surplus make of TAR and AMMONIACAL LIQUOR, for the Year ending March 25, 1891, at their Porth and Ystrad Works.
Ystrad Works (Bodringallt Siding, T.V.R.), about 10,000 gallons of Tar per annum in casks (Contractor to provide casks).
Porth Works (Eirw Branch Siding, T.V.R.), about 200 tons of Tar and 450 tons of Liquor per annum, in Contractor's Railway Tank-Wagons.
Price to be at per gallon for Tar from Ystrad; per ton for Tar from Porth. Liquor from Porth, price to be stated per ton of 4°, 5°, 6°, 7°, 8°, 9°, Twaddel (half degrees in proportion); 20 cwt. to the ton.
Delivery, f.o.r., at the above-mentioned Sidings.
Accounts quarterly, net.
If required, successful Contractor shall provide sureties for due fulfilment of Contract.
Intending Contractors may quote for both Tar and Liquor, or for either.
Tenders, to be addressed to the Secretary, Mr. A. P. James, 134, High Street, Merthyr Tydfil.
For any further particulars apply to Mr. F. J. BAYNES, 9, Ystrad Rhondda, Pentre, PONTYPRIDD.

TAR AND LIQUOR.

THE Directors of the Southampton Gaslight and Coke Company desire to receive TENDERS for surplus TAR and AMMONIACAL LIQUOR for One year from the 6th of March, 1890.
Estimated yearly make: Tar, 250,000 gallons; Ammoniacal Liquor, 500,000 gallons.
The Contractor must agree to remove the same whenever required, and not to allow an accumulation of more than 10,000 gallons of either Tar or Liquor.
Tank-trucks and barges can be loaded at the Company's Wharf.
Prices to be given for Liquor from 8 to 16 ozs. per 1000 gallons. Strength to be ascertained by the distillation process of (the late) Mr. F. W. Hartley, Assoc. Inst. C.E.
Prices for Tar to be per gallon.
Payments to be made in cash Fortnightly.
The successful Contractor will have to sign Agreement and Bond for the due performance of his Contract.
Tenders to be delivered to the undersigned not later than Ten o'clock in the Morning of March, 5, 1890.
The Directors do not pledge themselves to accept the highest or any tender.
C. CROWTHER SMITH, Secretary.
Ogle Road, Southampton,
Feb. 12, 1890.

IPSWICH GASLIGHT COMPANY.

TO INVESTORS.

THE Directors of the above Company invite APPLICATIONS for about £10,000 of MORTGAGE BONDS, in sums of £100, or any Multiple thereof. Interest at the rate of 3½ per cent. per annum.
For full particulars, apply to JOHN T. JOLLIFFE, Secretary.

THE Widnes Local Board are prepared to receive TENDERS for the supply of FIRE-CLAY, RETORTS, BLOCKS, and BRICKS.
Specifications and forms of tender may be obtained from Mr. Carr, Gas-Works, Widnes.
Tenders, endorsed "Fire-Clay Goods," to be addressed to the Chairman of the Gas Committee, and delivered to the undersigned, not later than Noon, on the 3rd of March.
The Board do not bind themselves to accept the lowest or any tender.
JAS. T. ALLEN, Clerk.
Town Hall, Widnes,
Feb. 13, 1890.

FAVERSHAM WATER COMPANY.

TENDERS are invited for the supply and erection of a 12-horse power "OTTO" GAS-ENGINE. Also for 9-inch Three-Throw DEEP-WELL PUMPS; and 1550 yards of 10-inch Cast-Iron SOCKET PIPES, VALVES, BRANCHES, &c. All to be fixed and laid complete for the Directors of the above Company.
Tenders to be sent, not later than Tuesday, the 11th of March next, to the undersigned, of whom all particulars may be obtained.
The lowest or any tender not necessarily accepted.
R. DARNEY, Manager.
Faversham, Feb. 20, 1890.

BOROUGH OF DARWEN.

TO TAR DISTILLERS, ETC.

THE Gas Committee are prepared to receive OFFERS for the purchase of all the surplus GAS TAR to be produced at their Works, for One, Two, or Three years, commencing April 1.
Coals carbonized: About 12,000 tons per annum.
Tar will be delivered into Contractor's Railway Tank-Wagons at the Corporation Private Siding.
Conditions and forms of tender, together with any further particulars may be obtained from Mr. T. Duxbury, Manager, Gas-Works, Darwen.
Sealed tenders to be delivered to me, marked "Tender for Tar," at or before Noon of the 24th day of March, 1890.
By order,
CHAS. COSTEKER, Town Clerk.

BOROUGH OF DARWEN.
(GAS AND WATER DEPARTMENTS.)

THE Corporation are prepared to receive TENDERS for the following:—
(1) 1000 feet of ⏀ Retorts and 400 feet of Oval Retorts, together with the necessary Bricks, Blocks, Tiles, Clay, &c., for setting same.
(2) All the Cast-Iron Pipes and Mains required for both Departments for One year, ending March 25, 1891.
(3) All Lead, Lead Pipes, Block Tin, &c., for One year, ending March 25, 1891.
Forms of tender for each contract, and further particulars can be obtained on application to Mr. T. Duxbury, Manager, Gas-Works, Darwen.
Sealed tenders to be delivered to me, marked "Tender for Retorts," "Iron Mains," or "Lead," respectively, at or before Noon of March 17, 1890.
The lowest or any tender not necessarily accepted.
By order,
CHAS. COSTEKER, Town Clerk.

BOROUGH OF MACCLESFIELD.

THE Gas Committee are prepared to receive TENDERS for the purchase of the surplus TAR and AMMONIACAL LIQUOR made at their Works during the Twelve months or Two years commencing the 1st day of May next.
Tenders for both One or Two years, and for the Tar or Liquor separately, to be sent in not later than Saturday, the 22nd of February, 1890, addressed to the Chairman of the Gas Committee, Town Hall, Macclesfield, and endorsed "Tender for Tar, &c."
For conditions, apply to Mr. Moore, Engineer, Gas-Works, Macclesfield.
The Committee reserve to themselves the right of accepting any tender for the Tar or Liquor separately.
The highest or any tender not necessarily accepted.
W. FREDK. TAYLOR, Town Clerk.
Feb. 10, 1890.

TO TAR DISTILLERS AND MANUFACTURING CHEMISTS.

THE Directors of the Wirksworth Gaslight and Coke Company, Limited, invite TENDERS for the surplus TAR and AMMONIACAL LIQUOR produced at their Works from the 1st day of April, 1890, to March 31, 1891.
Sealed tenders, endorsed "Tar and Liquor," to be forwarded to the Chairman not later than the 15th day of March, 1890.
The Directors do not bind themselves to accept the highest or any tender.
Particulars may be obtained from
B. S. JONES,
Manager and Secretary.
Wirksworth, Feb. 18, 1890.

COUNTY BOROUGH OF HALIFAX.

THE Gas-Works Committee of the Halifax Corporation are prepared to receive TENDERS for the execution of the works required in connection with the enlargement of their No. 4 GASHOLDER, by the addition of an OUTER LIFT, 184 ft. 6 in. in diameter, and 30 ft. 9 in. deep.
Specifications and plans may be seen, and forms of tender obtained, on application to Mr. Thomas Holgate, Engineer, Gas-Works, Halifax.
Tenders, endorsed "Gasholder," to be sent to the undersigned on or before Thursday, the 13th of March, 1890.
The Corporation do not bind themselves to accept the lowest or any tender.
By order,
KEIGHLEY WALTON, Town Clerk.
Feb. 21, 1890.

CRYSTAL PALACE DISTRICT GAS COMPANY.

NOTICE is hereby given that the ORDINARY HALF-YEARLY GENERAL MEETING of this Company will be held at the Albion Tavern, Aldersgate Street, on Friday, the 14th day of March, 1890, to receive the Report of the Directors, the Balance-Sheet confirmed by the Auditors, to elect two Directors and one Auditor, retiring by rotation, to declare a Dividend, and for General Purposes.
The Chair to be taken at Three o'clock precisely.
By order of the Board,
MAGNUS OHREN, Secretary.
Feb. 21, 1890.

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CONSPIRACY and Protection of Property Act. It is required, under a Penalty of FIVE POUNDS, that a Printed Copy of the 4th Section of this Act shall be posted up at all Gas-Works, in a conspicuous place, where the same may be conveniently read by the persons employed thereat.
Printed copies of this Section, in large type, on broad sheets, may be obtained of WALTER KING, 11, Bolt Court, FLEET STREET, E.C.
*** *The Act extends to Scotland and Ireland.*

TO INVENTORS AND PATENTEES.

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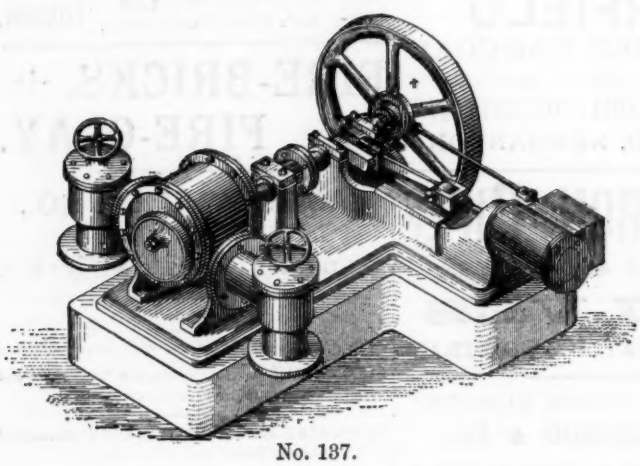

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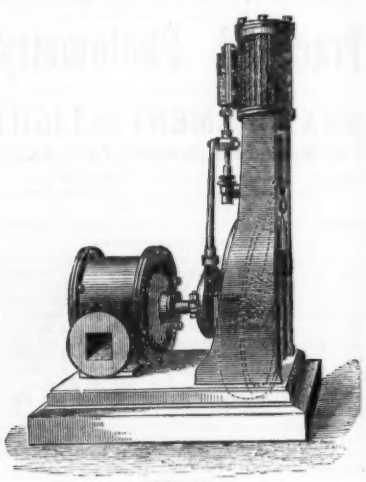

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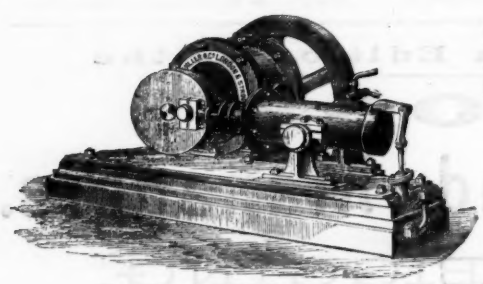

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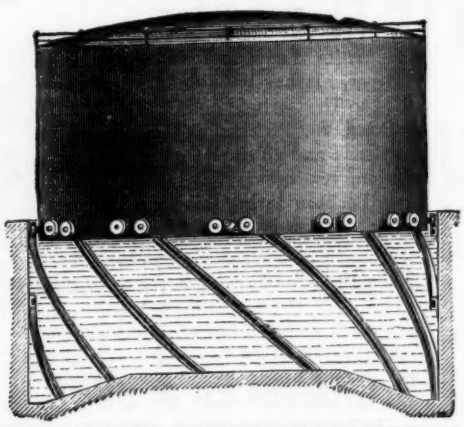

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Ratchet Screwing Stocks, and Adjustable Once-up Stocks, Dies, Guides, &c.

Inquiries and Trial Orders Solicited. Everything Guaranteed. Apply to

JOHN RUSCOE, Albion Works, Hyde, near Manchester.

ESTABLISHED 1825.

GAS TUBES

MANUFACTURERS OF EVERY DESCRIPTION OF

IRON OR STEEL LAP-WELDED OR BUTT-WELDED TUBES

FOR ANY PURPOSE.

D. HULETT & CO., LIMITED,

GAS ENGINEERS,

55 and 56, High Holborn, London,

MANUFACTURERS OF EVERY DESCRIPTION OF GAS-FITTINGS,

GAS-METERS, GAS-LAMPS, GOVERNORS, ETC.

HIGH-POWER LAMPS

OF THE MOST IMPROVED CONSTRUCTION.

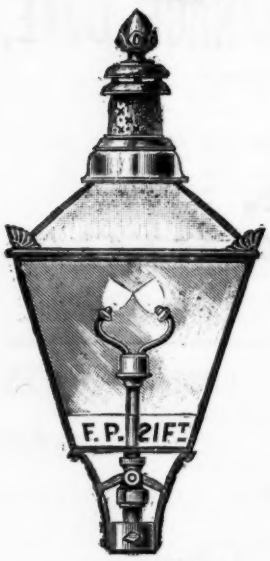
STRONG COPPER TOPS.

PATENT GOVERNOR BURNERS,

Giving from 16 to 450 Candle Power.

D. HULETT & Co., Limited,

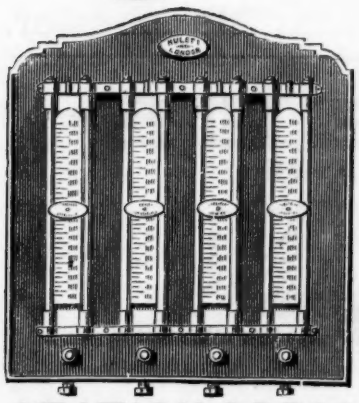
Invite Gas Companies and Local Authorities to compare the Quality of these Lamps with other Makers'.



PATENT STREET LAMPS.

NO PUTTY REQUIRED.

Several thousands of these have been made, and are giving every satisfaction. New Glass can be inserted in a few minutes by any inexperienced person.



HULETT'S

Patent Service Cleanser,

FOR REMOVING OBSTRUCTIONS IN SERVICE-PIPES AND MAINS.

No Gas Company should be without this Valuable Invention.

PATENT STREET LAMP GOVERNORS.

STATION PRESSURE GAUGES, on Enamelled Iron Plates.

WROUGHT AND CAST IRON TUBES AND FITTINGS.

WATER GAS FUEL GAS

FOR INDUSTRIAL PURPOSES

GENERATED FROM

BITUMINOUS SLACK COAL

BY THE

LOOMIS PROCESS.

The Cheapest Gas-Generating System in the World.

NOVEL IN DESIGN.
MODERN IN CONSTRUCTION.
SIMPLE IN OPERATION.
PERFECT IN RESULTS.

PROCESS AND APPARATUS PATENTED IN ALL COUNTRIES.

By this system more gas, and of a higher heating power per cubic foot, can be generated from a ton of Bituminous Slack Coal than by any other from a ton of Anthracite Coal or Coke.

The successful application of Water Gas for industrial purposes was brought about through this Process at the Works of the—

JOHN RUSSELL CUTLERY COMPANY, Turner's Falls, Mass., where it has been in daily use upwards of two years, doing all the Forging, Hardening, and Tempering.
HENRY DISSTON & SONS, Steel, Saw, and File Works, Philadelphia.
AMERICAN WALTHAM WATCH COMPANY, Waltham, Mass.
ADDYSTON PIPE AND STEEL COMPANY, Cincinnati.

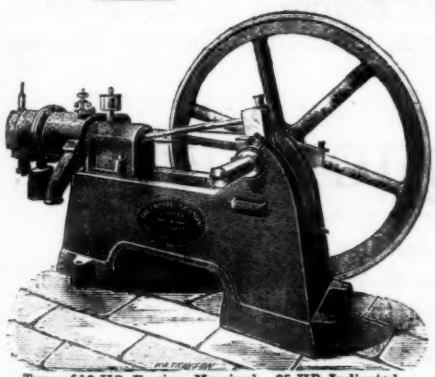
Many other industrial establishments in America are successfully using this Process, and a large number of Works are now being erected, including a plant at Brussels and at Sheffield (at Messrs. Thomas Firth and Sons, Limited).

This process is especially adapted for firing all classes of Pottery, Tile, and Brick Kilns.

For particulars apply to

NEWTON, CHAMBERS, & CO., LIMITED,
THORNCLIFFE IRON-WORKS, near SHEFFIELD.

THE "CAMPBELL" GAS-ENGINE.



Type of 10-HP. Engine Nominal. 25-HP. Indicated.

GREAT SUCCESS.

20 PER CENT. CHEAPER THAN ANY OTHER.
Gives the Highest Satisfaction with all kinds of Work.

Testimonial from Mr. JAMES MOON, Engineer to the Filey Gas-Works.

Feb. 9, 1889.

GENTLEMEN,—We have been using one of your Gas-Engines on our Works for about four months, and I have pleasure in saying that it does its work in a very satisfactory manner. The engine is half-horse power, steady in all its movements, and, with ordinary care, will drive the exhaust apparatus at an even gauge.—I remain, Yours respectfully,

(Signed) JAMES MOON.

For Price Lists and full particulars, apply to the Sole Makers:

THE CAMPBELL GAS-ENGINE CO., LIMITED,
WELL LANE, HALIFAX, YORKS.

RETORT SETTINGS IMPROVED

BY ADOPTING

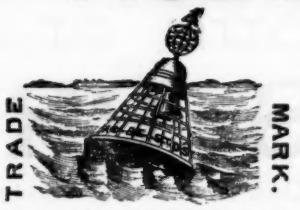
THE "NUGENT" & "ROBUS" SETTINGS.

ECONOMY WITH DURABILITY GUARANTEED.
HUNDREDS OF SETTINGS WORKING EMINENTLY SATISFACTORY.

Estimates and Particulars for every Description of Retort Extensions and other Work.

J. & H. ROBUS,
CONTRACTORS FOR GAS AND WATER WORKS,
20, BUCKLERSBURY, LONDON, E.C.

BELL'S ASBESTOS AQUOL PAINT



BELL'S ASBESTOS

IS MADE READY FOR USE.

IS FIRE RESISTING.
IS WASHABLE.
IS NON-POISONOUS.
IS MANUFACTURED IN ALL USEFUL COLOURS.
IS IMPERVIOUS TO HEAT, COLD, OR WATER.
IS WITHOUT SMELL.

No expensive Oil or Turpentine required.

WILL NEVER BLISTER.

HAS A COVERING CAPACITY **40** PER CENT. GREATER THAN LEAD PAINTS.

For Outside or Inside Work in any Climate.

Bell's Asbestos Aquol Paint is equally suitable for the finest decorative work as well as for general painting. It can be applied over or under any other paint, and, owing to its easy application, can be used with a large distemper brush; the SAVING THUS EFFECTED IN LABOUR BEING **50** PER CENT. OVER THAT OF LEAD PAINTS.

Bell's Asbestos Aquol Paint is susceptible of the most delicate treatment; and, owing to its perfect flatted surface, it brings up the varnish in a manner that no other paint can equal. ONE COAT OF VARNISH ON **Bell's Asbestos Aquol** IS EQUAL TO TWO COATS ON ORDINARY PAINT.

BELL'S ASBESTOS AQUOL PAINT is specially adapted for Private Houses, Exhibition Buildings, Ships, Churches, Asylums, School Boards, Railway Stations, and all work of Wood, Iron, Cement, Plaster, Stone, Brick, &c., &c.

Those who Study Economy and Protection from Fire should use only

BELL'S ASBESTOS AQUOL PAINT.

BELL'S ASBESTOS AQUOL PRIMING is made Ready for Use.
BELL'S ASBESTOS AQUOL PRIMING stops all suction of Wood, Cement, Plaster, &c.
BELL'S ASBESTOS AQUOL PRIMING should be applied to all New Work.

Suitable for Ceilings, Walls, and New Wood, and is very durable.

BELL'S ASBESTOS AQUOL KNOTTING, for Stopping Knots in New Work.

AN EXCELLENT CURE FOR DAMP WALLS.

Colour Cards and Price Lists on Application.

Supplied in Casks of 5 to 7 cwt., and Iron Drums of 28, 56, and 112 lbs., Sample Tins of 7 and 14 lbs.

Owing to its Covering Capacity, a SAVING IN FREIGHT of 40 per cent. is effected for a given surface.

BELL'S ASBESTOS COMPANY, LIMITED,

SOUTHWARK, LONDON, S.E.

DEPOTS—MANCHESTER: Cable Street, Blackfriars. LIVERPOOL: 2, Strand Street, James Street. CARDIFF: West Bute Street. BIRMINGHAM: 7, John Bright Street. HULL: Humber Dock Basin. GLASGOW: 35, Robertson Street. DUBLIN: 2, St. Andrew Street. BERLIN, BARCELONA, and ANTWERP.

BELL'S ASBESTOS

EXPANSION SHEETING.

EXPANSION RINGS.

The above, which can only be obtained from this house, is recognized as the **most efficient and economical jointing material in use.** It is composed of a specially-prepared India-rubber Compound, protected by a covering of Vulcanized Asbestos Sheeting, as shown above; and as it is the only Jointing Material which adequately **combines permanent elasticity with heat resistance,** the advantage it possesses will at once be seen.

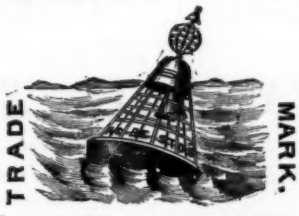
The centre from which the requisite elasticity is obtained will adapt itself to uneven surfaces to which it may be applied, and allow the expansion and contraction to be fully taken up. The covering being of Asbestos Cloth imparts a protection to the centre, and so prolongs its elasticity. **For Manhole, Mudhole, Steam Pipe, and Mash Tun Door Joints, it is unequalled;** and if applied as directed, **a ring can be used many times over.**

Made from 1-Ply for Cylinder and Faced Joints to any thickness for Uneven Surfaces.

BELL'S ASBESTOS CO., Ld.

DEPÔTS.

MANCHESTER: Cable St., Blackfriars.
LIVERPOOL: 2, Strand St., James St.
HULL: Humber Dock Basin.
DUBLIN, BERLIN.



BELL'S ASBESTOS.

DEPÔTS.

BIRMINGHAM: 7, John Bright Street.
GLASGOW: 35, Robertson Street.
CARDIFF: West Bute Street.
BARCELONA, and ANTWERP.

Southwark, London, S.E.

BELL'S ASBESTOS

YARN AND SOAPSTONE PACKING

Is the BEST LOCOMOTIVE PACKING made.

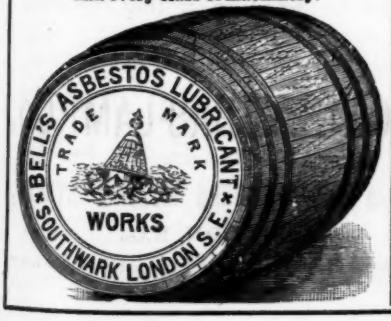
BELL'S

COMPOUND HYDRAULIC PACKING

Is specially suited for Hydraulic Machinery, Accumulators, and Ammonia and all Pumps.

BELL'S ASBESTOS LUBRICANT

Is unequalled For Steam-Engines & Cylinders, Gas-Engines, and every class of machinery.



BELL'S ASBESTOLINE

The reputation of this Lubricant is based on the experience of thousands of users, which places it far in advance of those who rely only on mere laboratory tests.

ASBESTOLINE IS THE CHEAPEST MOST EFFICIENT, CLEANEST MOST INODOROUS AND SAFEST LUBRICANT.

ASBESTOLINE HAS SAVED 90 PER CENT. OVER OIL. Has been used for all purposes, AND BEATEN ALL OTHER LUBRICANTS IN ACTUAL WORK.

BELL'S ASBESTOS

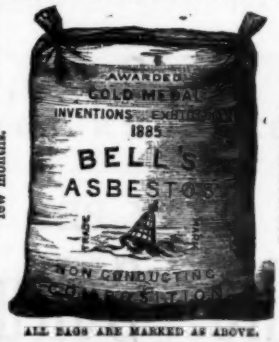
"DAGGER" PACKING

Is unequalled for every kind of Marine and Land Engine, Steam-Pumps, &c., and has proved itself to be the most efficient durable, and economical Packing made.

BELL'S ASBESTOS

NON-CONDUCTING COMPOSITION.

Will reduce loss by radiation, and saves 40 per cent. of fuel.
Is superior to any other, and saves its cost in a few months.



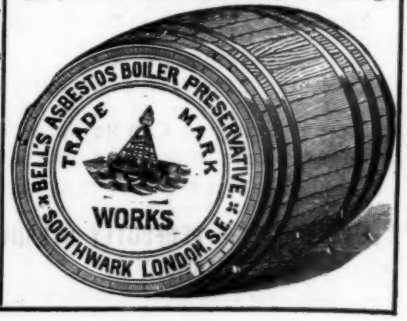
Can be applied again after many years' service. Is sent out dry in bags; therefore cheaper than others sent out wet.

ALL BAGS ARE MARKED AS ABOVE.

BELL'S ASBESTOS

BOILER PRESERVATIVE

Will effectually keep Boilers clean, and remove any Incrustation, without injury to the Boiler, Plates, or Fittings.



WILLIAM INGHAM & SONS,

WORTLEY FIRE-CLAY WORKS,
Near LEEDS,

Have confidence in drawing the special attention of GAS ENGINEERS to the following advantages of their Retorts:—

1. Smooth interior, preventing Adhesion of Carbon.
2. They can be made in one piece up to 10 feet long.
3. Uniformity in thickness, ensuring equal Expansion and Contraction.

PATENT
MACHINE-MADE GAS-RETORTS.

JOHN HALL & CO.,
STOURBRIDGE,

MANUFACTURERS OF FIRE-BRICKS, LUMPS, TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.
RETORTS CAREFULLY PACKED FOR SHIPMENT.
A STOCK OF DIFFERENT SHAPES ON HAND.

S. PONTIFEX & CO.,
GAS and WATER ENGINEERS,
Manufacturers of and Contractors for the Maintenance of
PUBLIC LAMPS & LANTERNS;
GLASS—Flint Opal, and Bent in Stock, and Cut to Sizes.
WELL LAMPS, STREET NAME TABLETS,
LAMP COLUMNS, HEAD IRONS, PUTTYLESS LAMPS,
LANTERN COCKS, REGULATORS,
Improved High-Power Lanterns for Lighting Street Refuges and Open Spaces.

BROWN'S PATENT
LAMPLIGHTERS' TORCHES.

PROPRIETORS AND MANUFACTURERS OF
BOX'S PATENT
PUTTYLESS STREET LAMP.

This Lamp may be supplied fitted with clear opal, or ribbed glass, *as also with enamel tops* if required. The necessary fittings for altering existing Lamps to this system can be supplied at moderate prices.

S. PONTIFEX & CO., 22, COLEMAN ST., LONDON.
Works: 18, STEPHEN STREET, TOTTENHAM COURT ROAD, W.

HANNA, DONALD, & WILSON,
(ESTABLISHED 1851)
GAS ENGINEERS & CONTRACTORS
FOR THE
ERECTION OF GAS AND WATER WORKS,
TELESCOPIC AND SINGLE-LIFT GASHOLDERS,
CAST AND WROUGHT IRON GASHOLDER-TANKS,
IMPROVED FIXED OR TRAVELLING HYDRAULIC PURIFIER-COVER LIFTERS,
PURIFIERS, CONDENSERS, SCRUBBERS, EXHAUSTERS, AND PUMPING-ENGINES,
TAR AND LIQUOR PUMPS, HYDRAULIC SLUICE AND SLIDE VALVES, LAMP-POSTS AND HYDRANTS COMBINED.

DESIGNS AND ESTIMATES SUPPLIED ON APPLICATION.

LONDON OFFICE: 9, FENCHURCH STREET, E.C.
ABERCORN FOUNDRY & ABBEY WORKS, PAISLEY, N.B.

SIXTY PER CENT. ECONOMY IN GAS LIGHTING.
The Schülke Regenerative Lamp

FOR
DOMESTIC AND EXTERNAL LIGHTING.

The only Regenerative Lamp employing the Common Flat-Flame Burners.

Lamps giving 20-Candle power consume less than four feet of Gas per hour.

PURE WHITE & PERFECTLY STEADY LIGHT,
NOT AFFECTED BY DRAUGHTS.

Suitable for any existing fittings (Brackets or Suspending).
Can be fixed in a few minutes.

May be seen at the Offices of the
SCHÜLKE GAS-LAMP Co.
LIMITED,
Room 446—11, QUEEN VICTORIA STREET,
LONDON, E.C.,
Where Price Lists and full particulars may be obtained.

JOSEPH CLIFF & SONS,

INCORPORATED IN THE LEEDS FIRE-CLAY COMPANY, Ltd.,

WORTLEY, LEEDS.

LONDON Offices & Depôts:
Baltic Wharf, Waterloo Bridge.
WHARVES NOS. 2 & 4, INSIDE G.N. GOODS YARD, KING'S CROSS, N.
LIVERPOOL:
16, Lightbody Street.
LEEDS:
Queen Street.

MACHINE-MADE RETORTS

Have been made in large quantities for the last twelve years; and during the whole of that time, have been in regular use at most of the largest Gas-Works in the Kingdom. They possess the excellent quality of remaining as near stationary as possible under the varying conditions of their work—a quality which will be appreciated by all Gas Engineers and Managers. The generally expressed opinion is that these Retorts are the very best that are made.

RETORTS CAREFULLY PACKED FOR EXPORT.

Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas-Works.

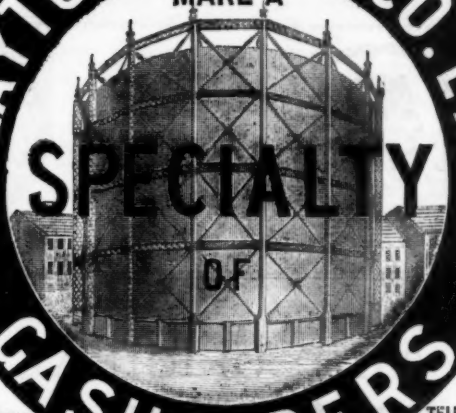
ESTABLISHED MORE THAN A QUARTER OF A CENTURY

WORKS HUNSLET, LEEDS

LONDON OFFICE: 60, QUEEN VICTORIA STREET E.C.

CLAYTON SON & CO. LTD.

MAKE A SPECIALTY OF GASHOLDERS



AND MAKERS OF **GAS PLANT** OF EVERY DESCRIPTION.

REG^D TELEGRAPHIC ADDRESS: "GAS LEEDS"

GAS COAL.

BEST
REAL OLD SILKSTONE GAS COAL.
Address, THE STRAFFORD COLLIERIES COMPANY,
Near BARNSLEY, SOUTH YORKSHIRE.

THE WIGAN COAL & IRON CO., LIM^TD.,

Are exclusive Owners of the well-known HAIGH HALL & KIRKLESS HALL GAS COAL COLLIERIES, and supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, Cannel Nuts, &c.

MIDLAND DISTRICT OFFICE: 22, TEMPLE STREET, BIRMINGHAM—AGENT: A. C. SCRIVENER.

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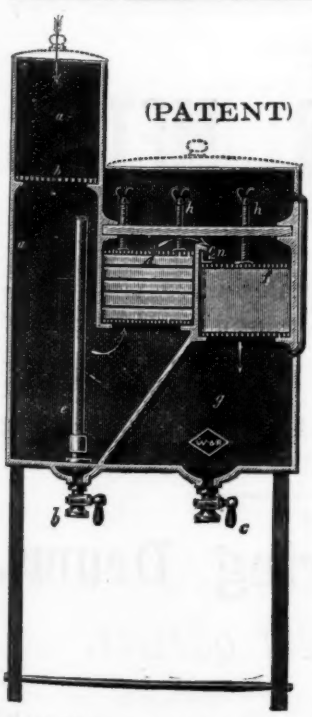
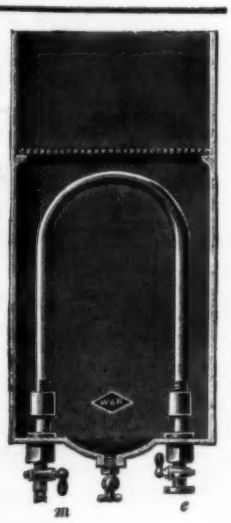


THE
"Diamond"
(PATENT)
Waste Oil Filter
FOR
Purifying Refuse Oil and Grease, in Engine-Rooms, Boiler-Houses, &c.

PAYS FOR ITSELF IN A VERY SHORT TIME.



Used by
Stafford Corporation Gas-Works; L.B. & S.C. Ry. Co., New Cross; Union Bank, Ltd., London; H.H. The Maharajah of Mysore; Plymouth Works; &c., &c.

Prices and Particulars on application to

WOODHOUSE & RAWSON
UNITED, LIMITED,
88, QUEEN VICTORIA STREET, LONDON, E.C.;
41, PICCADILLY, BRADFORD; & CORNBROOK TELEGRAPH WORKS, MANCHESTER.

W. PARKINSON & Co.,

GAS ENGINEERS.

London, 1885.

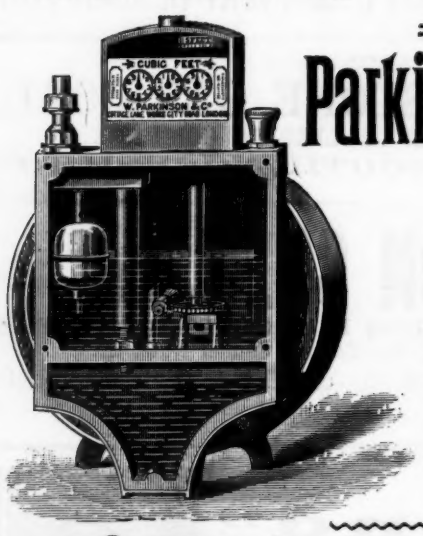
GOLD AND SILVER MEDALS,
London, 1884.

Melbourne, 1888-9.

ESTABLISHED 1816.

THE ORIGINAL MANUFACTURERS OF

WET METERS



Parkinson's Ordinary Wet Meter

IN CAST-IRON CASE.

Works with very little friction. Will stand very high pressures. Cannot possibly be shut off by sudden increase of pressure, the Float being affected by Outlet Gas only. Allows for loss of water by evaporation without materially affecting the registration or shutting off the gas. Unexcelled for simplicity of construction, excellence of workmanship, or accuracy in registration.

COMPENSATING METERS

IN TINNED OR CAST-IRON CASES.

The Slow-Spoon Compensator has been in extensive use for many years; it maintains an unvarying water-line without appreciable friction, and provides a large reserve of water. The Float arrangement allows sudden or excessive pressure on the Inlet without affecting the working of the Meter or extinguishing the Lights.

ALL WET METERS ARE FITTED WITH OUR

Patent Three-Partition Measuring Drums.

Also Makers of DRY METERS of the VERY BEST QUALITY.

COTTAGE LANE WORKS, CITY ROAD, LONDON. TELEGRAPHIC ADDRESS: "INDEX LONDON."

[See also Advt., p. 324.

London: Printed by WALTER KING (at the Office of King, Sell, and Railton, Ltd., 12, Gough Square); and published by him at No. 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, Feb. 25, 1890.